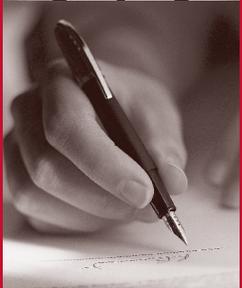


2009–2010

COURSES of Study

Cornell University



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Cornell University has an enduring commitment to support equality of education and employment opportunity by affirming the value of diversity and by promoting an environment free from discrimination. Association with Cornell, either as a student, faculty, or staff member, involves participation in a free community where all people are recognized and rewarded on the basis of individual performance rather than personal convictions, appearance, preferences (including sexual or affectional orientation), or happenstance of birth.

Cornell University's history of diversity and inclusion encourages all students, faculty, and staff to support a diverse and inclusive university in which to work, study, teach, research, and serve. No person shall be denied admission to any educational program or activity or denied employment on the basis of any legally prohibited discrimination involving, but not limited to, factors such as race, color, creed, religion, national or ethnic origin, gender, sexual orientation, age, gender identity or expression, marital status, disability, or veteran status. Cornell University is an affirmative action, equal opportunity employer.

Concerns and complaints related to equal opportunity in education and employment based on aspects of diversity protected under federal, state, and local law, including sexual harassment complaints filed by any member of the Cornell community against an academic or nonacademic staff member, as well as complaints arising under Title IX, should be directed to the Office of Workforce Diversity, Equity and Life Quality (WDELQ), 160 Day Hall, Ithaca, NY 14853-2801 (telephone: 607-255-3976; fax: 607-255-7481; TDD: 607-255-7066; e-mail equalopportunity@cornell.edu).

Cornell University is committed to assisting those persons with disabilities who have special needs related to their educational pursuit or employment. Information on services provided to prospective and current Cornell students with disabilities can be obtained by contacting Student Disability Services, Center for Learning and Teaching, 420 Computing and Communications Center, Ithaca, NY 14853-6601 (telephone: 607-254-4545; facsimile: 607-255-1562; TDD: 607-255-7665, www.clt.cornell.edu). Prospective employees in need of workplace accommodation for participation in the selection process should contact WDELQ. Current employees in need of a workplace accommodation pursuant to the Americans with Disabilities Act or New York State law should contact Medical Leaves and Administration, 840 Hanshaw Rd., Ithaca, NY 14850 (telephone: 607-216-1400, fax: 607-216-1425).

All members of the Cornell Community are encouraged to report bias activity, including hate crimes, either experienced directly or observed to WDELQ. They may also report the matter to a bias reporting team member (www.cornell.edu/diversity/biasreport.cfm).

Members of the Cornell University community are strongly encouraged to report immediately any criminal activity and suspicious person(s) to the Cornell University Police Department (607 255-1111). Incidents that may or may not be crimes may also be reported to "campus security authorities," which include, in addition to the Cornell University Police, those with responsibility for controlling access to buildings or facilities and officials having significant responsibility for students or campus activities. Licensed counselors and campus clergy (pastoral counselors) are exempt from reporting requirements. Cornell University encourages counselors and clergy, if and when they deem it appropriate, to inform those who they counsel of procedures for reporting crimes on a voluntary, confidential basis for inclusion in the Cornell University Police Statistical Crime Record.

For Cornell University directory information or general information, call 607 255-2000 or 607 254-INFO. Courses of Study is available on the web at cornell.edu/academic/courses/cfm.

To obtain a copy of this catalog, please follow these guidelines:

If you are a prospective undergraduate student and don't have web access, please contact the Undergraduate Admissions Office, Cornell University, 410 Thurston Ave., Ithaca, NY 14850-2488, 607 255-5241.

If you are a prospective graduate student, please consult the listing of the course catalog on the web (see above for address).

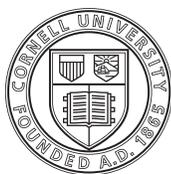
If you are a currently enrolled student, please consult the listing of the course catalog on the web (see above for address) or contact your college registrar.

All others please contact the Office of the University Registrar, Cornell University, B07 Day Hall, Ithaca, NY 14853-2801, 607 255-4232, e-mail: dtsy1@cornell.edu

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Cornell University

Courses of Study

2009–2010

Accreditation

Cornell University is accredited by the Middle States Commission on Higher Education.

A copy of the most recent reaffirmation of Cornell's accreditation can be found at dpb.cornell.edu/accreditation.htm. Requests to review additional documentation supporting Cornell's accreditation should be addressed to Marin Clarkberg, Associate Director, Institutional Research and Planning, Cornell University, 441 Day Hall, Ithaca, NY 14853-2801, mec30@cornell.edu.

Cornell University

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Key

- M Monday
- T Tuesday
- W Wednesday
- R Thursday
- F Friday
- S Saturday
- S-U Satisfactory-Unsatisfactory
- disc discussion
- lab laboratory
- lec lecture
- rec recitation
- sec section
- TBA to be announced/to be arranged
- @ geographic breadth
- # historical breadth
- Courses with names and descriptions enclosed in brackets—[]—are not offered fall 2009 and spring 2010.
- All area codes are 607 unless otherwise specified.

CORNELL UNIVERSITY—GENERAL INFORMATION

Introduction

Courses of Study (www.cornell.edu/academics/courses.cfm), a catalogue of Cornell University's many academic programs and resources, contains information about colleges and departments, interdisciplinary programs, undergraduate and graduate course offerings, and procedures. Students also should consult with their college's advising office for specific information on their college's academic policies and procedures, degree programs, and requirements. Not included in this publication is information concerning the Medical College and the Graduate School of Medical Sciences, located in New York City.

It is not possible to keep this single volume completely up-to-date. The most current information regarding course descriptions, schedules, sections, rooms, credits, and registration procedures may be found at www.cornell.edu/academics/courses.cfm, which also includes the Course and Time/Room Rosters. Students are also advised to consult individual college and department offices for up-to-date course information.

Cornell community members are expected to comply with all university policies, including the Code of Conduct and the Code of Academic Integrity available at www.policy.cornell.edu.

The following are offices and sources of information about admission to Cornell University.

Undergraduate Admissions Office, 410 Thurston Avenue, Ithaca, NY 14850-2488, 255-5241, admissions.cornell.edu.

Graduate School, 143 Caldwell Hall, Ithaca, NY 14853-2602, 255-5820, gradschool.cornell.edu, gradschool@cornell.edu.

Law School, Myron Taylor Hall, Ithaca, NY 14853-4901, 255-5141, www.lawschool.cornell.edu/admissions, lawadmit@lawschool.cornell.edu.

Samuel Curtis Johnson Graduate School of Management, Office of Admissions, 111 Sage Hall, Ithaca, NY 14853-6201, 255-4526, www.johnson.cornell.edu.

College of Veterinary Medicine, Office of Student and Academic Services, Cornell University, S2009 Schurman Hall, Ithaca, NY 14853-6401, 253-3700, www.vet.cornell.edu/prospective.htm.

Weill Cornell Medical College, Office of Admissions, 445 E. 69th Street, New York, NY 10021, 212-746-1067, www.med.cornell.edu/education/admissions, wcmc-admissions@med.cornell.edu.

Graduate School of Medical Sciences of Cornell University, Office of Admissions, 445 E. 69th Street, New York, NY 10021, 212-746-6565, www.biomedsci.cornell.edu, wgms@med.cornell.edu.

University Registration

University registration is the official recognition of a student's relationship with the university and is the basic authorization for a student's access to services and education. Completion of registration is essential to enable the university to plan for and provide services and education, guided by the highest standards for efficiency and safety. Unauthorized, unregistered persons who use university services and attend classes have the potential to use university resources inappropriately and to displace properly registered students. In addition, the university assumes certain legal responsibilities for persons who participate as students in the university environment. For example, policy states that New York State health requirements must be satisfied. Because these requirements are intended to safeguard the public health of students, the university has a responsibility to enforce the state regulations through registration procedures.

The policy on university registration is intended to describe clearly the meaning of and the procedures for registration so that students can complete the process efficiently and be assured of official recognition as registered students. With the clear communication of the steps for registration, it is hoped that compliance will occur with a minimum of difficulty.

To become a registered student at Cornell University, a person must

- complete course enrollment according to individual college requirements;
- settle all financial accounts, including current semester tuition;
- satisfy New York State and university health requirements;
- have no holds from their college, the Office of the Judicial Administrator, Gannett Health Services, or the bursar.

Individuals must become registered students by the end of the third week of the semester or their access to services and education will be terminated and they will be subject to a \$350 late fee, then \$25 per week after the sixth week plus any finance charges.

Cornell University does not allow persons who are not registered with the university in a timely manner to attend classes, reside in university-owned residences, or use any other university services. The university reserves the right to require unauthorized, unregistered persons who attend classes or in other ways seek to exercise student privileges to leave the university premises. The university does not permit retroactive registration and does not record courses or grades for unregistered persons.

LEAVES AND WITHDRAWALS

Students wishing to take a leave from their college are required to apply for a voluntary Leave of Absence (LOA) with an expected

return date. Students who do not apply for and receive approval for a LOA will be automatically withdrawn from the university following the fifth week of the semester and may be required to apply for readmission. Withdrawn students and students on a LOA may not enroll in course work with the university (e.g., extramural studies, summer/winter session). Students on a LOA are not eligible for privileges afforded to full-time registered students, including housing, dining, library, and transit privileges.

Students may withdraw from the university at their own discretion. In addition, a college may withdraw a student who fails to return at the end of a period of authorized leave.

Medical leaves are granted by the student's college upon recommendation by Gannett Health Services.

Bursar Information

TUITION, FEES, AND EXPENSES

Tuition for Academic Year 2009–2010

Endowed Divisions

Undergraduate

Architecture, Art, and Planning	
Arts and Sciences	
Engineering	
Hotel Administration	\$37,750

Graduate

Graduate School (with chair in an endowed college)	\$29,500
Johnson Graduate School of Management Two-Year Program	
entering students	\$47,150
second-year students	\$46,700

Professional

Law School	
entering and second-year students	\$48,950
third-year students	\$48,050
LL.M. one-year program students	\$51,530

Contract Divisions (tuition rates are tentative)

Undergraduate

Agriculture and Life Sciences	
Human Ecology	
Industrial and Labor Relations	
New York State resident*	\$21,610
Nonresident	\$37,750

Graduate and Professional Students

Graduate School (with chair in a contract college)	\$20,800
Veterinary Medicine	
New York State resident DVM	\$26,500
Nonresident DVM	\$39,500
Graduate, Ph.D.	\$20,800

Student Activities Fee (Tentative)

Undergraduate students	\$204
Graduate and professional students	\$70

Summer Session (2009) \$970
per credit**

In Absentia Fees

Undergraduate \$200 per semester
Graduate and professional \$200 per semester
Law and management \$75 per semester

The amount, time, and manner of payment of tuition, fees, or other charges may be changed at any time without notice.

* **Residency status** is determined at the time of admission by the college. Change in residency status is determined by the university bursar following matriculation. The deadline for submission of requests for the Fall 2009 semester is June 1, 2009. The deadline for the Spring 2010 semester is November 1, 2009. Further information and an application can be found at www.bursar.cornell.edu.

****Regular session rate.** Special program rates may vary.

Admission application fees and forms may be found at www.cornell.edu/admissions.

Tuition Refund Policy

Amounts personally paid for tuition may be refunded if the student requests a leave of absence or withdrawal from the office of the dean of his or her college of enrollment. The date of this request will determine the tuition liability for the semester. All students refer to the "Proration Schedule for Withdrawals and Leaves of Absence" below.

Repayment policy. Students receiving financial aid from the university who withdraw during a semester will have their aid reevaluated, possibly necessitating repayment of a portion of aid received. Repayment to aid accounts depends on the type of aid received, government regulations, and the period of time in attendance. Cornell is authorized to offset any credit balances against any debts owed by the student to the university.

Proration Schedule for Withdrawals and Leaves of Absence

Fall 2009 and Spring 2010

Percentage	All Students	
	Fall 2009	Spring 2010
no charge	8/27-9/2	1/25-1/31
10% charge	9/3-9/9	2/1-2/7
20% charge	9/10-9/23	2/8-2/21
30% charge	9/24-9/30	2/22-2/28
40% charge	10/1-10/7	3/1-3/7
50% charge	10/8-10/14	3/8-3/14
60% charge	10/15-10/21	3/15-3/21
80% charge	10/22-10/28	3/22-3/28
100% charge	10/29	3/29

Special programs, such as Cornell Abroad and Executive MBA, may follow their own tuition refund policies for withdrawals and leaves of absence. Please refer to the appropriate program office for details regarding those policies.

BILLING AND PAYMENT

Billing

Electronic billing (E-billing) is the official method of billing. Paper bills will not be sent. Tuition and room and board charges will be billed in July and December and must be paid before registration. The due date for these semester bills will normally be 5 to 10 working days before registration day. All other charges, credits, and payments will appear on monthly statements.

It is possible that some charges will not be listed on the first bill and will appear on a subsequent monthly bill. *A student must be prepared to pay any charges appearing on a subsequent bill even though the student receives a financial aid stipend before the charges are billed.*

All payments are due by the due date stated on the bill; all payments must be *received* by that date to avoid *finance charges*. Payments are *not* processed by postmark.

The Office of the Bursar conducts all business directly with the student. Monthly charges, as well as any awards, grants, scholarships, and loans, are listed and billed under the student's name. Refund checks and direct deposit refunds are also drawn in the name of the student. Cornell is also authorized to offset any credit balances against any debts owed by the student to the university.

Payments

An individual who has outstanding indebtedness to the university will not be allowed to register or reregister in the university, receive a transcript of record, have academic credits certified, be granted a leave of absence, or have a degree conferred. University policy precludes the use of any current financial aid for payment of past-due charges.

The Office of the Bursar acts as a clearinghouse for student charges and credits that are placed directly on a student's bill by several departments and offices of the university. *Because the Office of the Bursar does not have detailed records concerning many items that appear on a bill, students should contact the office involved if they have questions.*

For further information, students should contact the Office of the Bursar, Cornell University, 260 Day Hall (tel. 255-2336; fax 255-6442; uco-bursar@cornell.edu; www.bursar.cornell.edu). Bursar account information may be viewed real time on *Student Center*.

Student Health Insurance

Because of the high cost of medical care, it is Cornell University policy that every full-time registered student must have health insurance coverage.

The Student Health Insurance Plan (SHIP) is developed especially for Cornell students and provides extensive coverage at a reasonable cost for most on- or off-campus medical care. Complete and current details of the SHIP, its cost, and population-specific material for undergraduates, graduate students, and professional students are mailed to each student

in July. Undergraduates, graduate students, and professional students each have separate deadlines and guidelines. Please be sure to check the July mailing for complete details.

The Student Health Insurance Plan provides coverage 24 hours a day, 365 days a year, anywhere in the world. Students graduating midyear may be eligible to purchase the Early Grad Plan. Those enrolled in the SHIP may enroll their eligible dependents for an additional cost (fall deadline: September 30). Graduate and professional students who prefer to pay monthly must enroll in the installment payment plan no later than September 30. Because of policy restrictions, the plan is nonrefundable (except for dependents who no longer meet eligibility requirements and students who withdraw from Cornell within the first 30 days of the academic year).

For more information, students should contact Cornell University Office of Student Health Insurance, 409 College Avenue, Suite 211 (tel. 255-6363; sicu@cornell.edu; www.studentinsurance.cornell.edu).

Student Record Privacy Statement: Annual Notification Under FERPA

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. Further details may be found in Cornell Policy 4.5 Access to Student Information, available at www.policy.cornell.edu/Vol.4_5.cfm. These rights include:

1. The right to inspect and review the student's education records within 45 days of the day the university receives a request for access.

Students should submit to the office of the university registrar, written requests that identify the record(s) they wish to inspect. The university official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the university official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.

2. The right to consent to disclosures of personally identifiable information contained in the student's education records, except to the extent that FERPA authorizes disclosure without consent:
 - a. Disclosure to school officials with legitimate educational interests. A school official is a person employed by the university in an administrative, supervisory, academic (including emeritus faculty), research, or support staff position (including law enforcement unit personnel and health staff); a person or company with whom the university has contracted (such as an attorney, auditor, or collection agent); a person serving on the Board of Trustees; or a student serving on an official committee, such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks.

A school official has a legitimate educational interest if the official needs to review an education record to fulfill his or her professional responsibility.

- b. Upon request, to officials of another school in which a student seeks or intends to enroll.
- c. To parents or legal guardians of dependent students as that term is defined in the Internal Revenue Code. In general, the university does not make education records available to the parents of a student. However, where the university believes that it is in a dependent student's best interest, information from the student's education records may, at the university's discretion, be released to the parents or legal guardians of such a dependent student. Such disclosure generally will be limited to information about a student's official status at the university, but parents or legal guardians of a dependent student may also be notified upon the authorization of the dean of the student's college, or the Vice President for Student and Academic Services, or the Dean of Students, or their designees in the following cases:
 - when a student has voluntarily withdrawn from the university or has been required by the university to withdraw;
 - when a student has been placed on academic warning;
 - when the student's academic good standing or promotion is at issue;
 - when a student engages in alcohol- or drug-related behavior that violates Cornell policies;
 - when a student has been placed on disciplinary probation or restriction.
 - in exceptional cases when a student otherwise engages in behavior calling into question the appropriateness of the student's continued enrollment in the university.

Unless otherwise indicated in writing by the student at the time of registration, or thereafter, the university will presume that a full-time undergraduate student is a dependent as that term is defined in the Internal Revenue Code. Undergraduate students who are not financially dependent and do not wish to permit their parents or legal guardian access to their education records should advise the Office of the University Registrar in writing and provide evidence of financial independence. Graduate and professional students are not assumed to be financially dependent upon their parents or legal guardian for these purposes.

- d. Disclosure of directory information. Cornell University has defined directory information to include the following: name, local address, local telephone listing, e-mail address, photograph, major field of study and college attended, dates of attendance, enrollment status, participation in officially recognized activities and sports, weight and height (of members of athletic teams) and any degrees earned and awards received. Directory information may be released unless the student updates his/her privacy settings on *Student Center*. Students who

wish to suppress their directory information from the printed telephone directory must perform this update within 10 days of the date of official university registration. Students may rescind their no-release request at any time by writing to the Office of the University Registrar or on *Student Center*.

3. The right to request the amendment of the student's education record that the student believes is inaccurate.

Students may ask the office of the university registrar to amend a record that they believe is inaccurate. They should write the university official responsible for the record, clearly identify the part of the record they want changed, and specify why it is inaccurate.

If the university decides not to amend the record as requested by the student, the university will notify the student of the decision and advise the student of his or her right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.

4. The right to file a complaint with the U.S. Department of Education concerning alleged failures by Cornell University to comply with the requirements of FERPA. The name and address of the office that administers FERPA is:

Family Policy Compliance Office
U.S. Department of Education
400 Maryland Avenue, SW
Washington, DC 20202-5901

Financial Aid and Federal Loans Satisfactory Academic Progress Policy for Undergraduate Students

Federal regulations (General Provision CRF 668.1) require that Cornell University review the academic progress of students who apply for and/or receive financial assistance. This includes but is not limited to the William D. Ford Federal Direct Loan program and all Cornell grants. To be making satisfactory academic progress toward a degree, students must maintain specified grade point averages and proceed through the program at a pace leading to completion within a specified time frame. This regulation applies to each financial aid applicant, whether a previous aid recipient or not. Failure to make satisfactory academic progress may affect your eligibility for financial aid. The specific requirements for GPA and credit hours can be found by reviewing the complete policy on the Office of Financial Aid and Student Employment web site, finaid.cornell.edu.

Academic Integrity

Absolute integrity is expected of every Cornell student in all academic undertakings. Any fraudulent act by a student to advance his or her academic status merits a severe penalty and such cases are governed by the Code of

Academic Integrity. A pamphlet titled the *Code of Academic Integrity and Acknowledging the Work of Others* is available from the office of the dean of faculty, and at www.policy.cornell.edu/Code_of_Academic_Integrity.cfm.

Protection of Human Participants in Research

The Human Research Protection Program is designed to assure the safety and well-being of individuals who participate in research projects at Cornell University. Research activities covered by the Human Research Protection Program include, but are not limited to, experiments and psychological or physical tests on humans, surveys, questionnaires, and studies of existing data, documents, or records in which there are individual identifiers. To help faculty, students, and staff members determine if an activity or project falls under the purview of Cornell's Human Research Protection Program, the Office of Research Integrity and Assurance (ORIA) has developed a Decision Tree, available at www.irb.cornell.edu.

The Institutional Review Board for Human Participants (IRB) is the official review board for all university projects that seek to use humans as research participants, assuring compliance with university policy and federal regulations protecting human subjects in research at universities. All proposals involving human participants in any category, including those initiated by students, must be submitted to the IRB for review before any research activities begin. Only after receiving an approval letter from the IRB, or an Exemption from IRB Review by ORIA, may a project be initiated. The guidelines for the use of human participants in research are available at www.irb.cornell.edu. Inquiries and communications about the guidelines should be directed to the IRB administrator (255-5138; irbhp@cornell.edu).

Use of Animals for Courses

Vertebrate animals serve as an invaluable aid in instruction. It is recognized, however, that some students have ethical objections to the use of vertebrate animals in this manner. Courses that use vertebrate animals are identified as such in the course descriptions. Students who have concerns about the use of animals in these courses should consult the course instructor for more information about the precise ways in which the animals are used. A set of university guidelines on the use of vertebrate animals in teaching for faculty and students is printed below and is available from departments in which the courses are offered. The use of live vertebrates in instruction is reviewed and approved by the Institutional Animal Care and Use Committee (IACUC) (www.iacuc.cornell.edu).

Cornell's Animal Users Health and Safety Program (AUHSP) covers faculty, staff, students, visiting scholars, contractors, and volunteers who have direct or indirect exposure to Cornell-owned vertebrate research and training animals. Program requirements are based on the type and frequency of exposure to animals, animal tissues, and/or time spent in an animal care facility (e.g., working, visiting, doing

maintenance work). Students enrolled in courses utilizing vertebrate animals are required to fill out a Risk Assessment Form (www.oria.cornell.edu/AUHSP/documents/AUHSPRiskAsstForm.pdf) and enroll in the AUHSP. Additionally, students should contact the Occupational Medicine Office of Gannett Health Services, or their personal health care provider, before working with animals or entering an animal facility, if they may have any medical conditions that may increase their risk.

Background: On December 8, 1987, the Cornell University Institutional Animal Care and Use Committee approved a series of guidelines recommended to them by the University Animal Welfare Committee. These guidelines were prepared by a subcommittee of faculty members, after they had the opportunity to evaluate the use of animals in undergraduate teaching (and student concerns for the same) from a representative sample of instructors.

Guidelines

1. For demonstrating certain principles and procedures, the use of animals in teaching is recognized as an invaluable, often essential, pedagogical device.
2. For courses in which vertebrate animals are to be used in dissection, surgery, or in other experimental procedures, the course description that appears in *Courses of Study* should alert students to this fact.
3. A detailed description of the intended use of vertebrate animals should be available to students upon request to the instructor of each course.
4. Faculty members are encouraged to explain their reasons and need for using vertebrate animals and should indicate to students the availability of the procedures described in item 8 below.
5. Students are encouraged to discuss their concerns about the instructional use of vertebrate animals with the instructor of the course.
6. When consistent with pedagogical objectives, faculty members are encouraged to consider adopting alternative methods and procedures that do not involve the use of live animals.
7. When students object on ethical or other valid grounds to participating in an exercise using vertebrate animals, instructors are encouraged to provide alternative means when consistent with pedagogical objectives for learning the same material.
8. A student who is reluctant to voice his or her concerns about animal use in a particular course or who thinks these concerns have not received proper attention may seek assistance from the chair of the Institutional Animal Care and Use Committee (IACUC) at 255-3749 or by e-mail at iacuc-mailbox@cornell.edu. Confidential reports may be made to http://secure.ethicspoint.com/domain/en/report_custom.asp?clientid=6357.
9. Faculty members should instruct students in the responsible use of animals. For more information, see www.policy.cornell.edu/vol1_4.cfm.

Advanced Placement

Definition and Purpose of Advanced Placement Credit

Advanced placement credit is college credit that students earn before they matriculate as freshmen and that counts toward the degree and degree requirements as specified by the individual college at Cornell. Its primary purpose is to exempt students from introductory courses and to place them in advanced courses. Its value is that it allows students to include more advanced courses in their course of study.

Sources of Advanced Placement Credit

Advanced placement credit may be earned from the following:

1. The requisite score from the Advanced Placement Examinations (AP exams) from the College Entrance Examination Board (CEEB) in Princeton, N.J. The requisite scores, which vary by subject, are determined by the relevant departments at Cornell and are listed on pages 9–10.
2. Acceptable performance on a Cornell department exam (offered only in some subjects, usually during orientation).
3. A regular course taught at an accredited college to college students and approved by the relevant department at Cornell. Some departments accept credit from virtually all accredited colleges; some do not.
4. GCE Advanced Level and International Baccalaureate Examinations are listed on page 11.

Note: *Cornell University does not accept credit for courses sponsored by colleges but taught in high schools to high school students, even if the college provides a transcript of such work.*

Students who have taken such courses may, however, earn credit by taking an appropriate examination as described in paragraph 1 or 2 above.

The appropriate department of instruction within the university sets the standards of achievement that must be met for advanced placement in its subject, recommends Advanced Placement credit for those who meet the standards, and determines which Cornell courses the credit places students out of. The final decision for awarding advanced placement credit at Cornell and applying it to degree requirements rests with each individual college (consult the relevant college sections of *Courses of Study*). Students need not accept advanced placement, although forfeiting the advantage of moving quickly into advanced courses affects one's overall education. If they take the Cornell course they have placed out of, they relinquish the advanced placement credit.

Advanced placement examinations.

Entering first-year students should have their scores from CEEB Advanced Placement Examinations sent to their college or school registrar's office (see list below).

Departmental advanced standing examinations.

In certain subjects, students may also qualify for advanced placement or credit, or both on the basis of departmental examinations given on campus during Orientation Week. A schedule of these examinations appears in the orientation booklet mailed in late summer to entering

students. The departments that award advanced placement and credit on the basis of departmental examinations are shown on pages 9–12. Students need to register for those examinations in the relevant department.

Transfer of credit. Entering first-year students who have completed college courses for which they want to receive credit toward their Cornell degree should send transcripts and course syllabi to their college or school office (see the list below).

Written inquiries. Students can address questions to departments, schools, or college offices by adding Ithaca, NY 14853 to the addresses given in the following sections.

College of Agriculture and Life Sciences
140 Roberts Hall

College of Architecture, Art, and Planning
B1 West Sibley Hall

College of Arts and Sciences
55 Goldwin Smith Hall

College of Engineering
158 Olin Hall

School of Hotel Administration
180 Statler Hall

College of Human Ecology
145 Martha Van Rensselaer Hall

School of Industrial and Labor Relations
101 Ives Hall

CREDIT AND PLACEMENT

The tables on the following pages summarize how credit and placement are determined for most subjects. Supplementary information for some subjects is also provided.

International Credentials

The policies currently in effect for General Certificate of Education (GCE) "A" Level Examinations and International Baccalaureate Higher Level Examinations are summarized in the table on pages 9 and 10. Students may submit results of the French Baccalaureat or German Abitur for possible credit depending on the stream or specialization followed. Accepted students holding any other secondary school credentials are urged to sit for the Advanced Placement Examinations of the College Entrance Examination Board or for the departmental examinations offered during Orientation Week.

The table lists subjects and the marks for which credit will be awarded.

CEEB's AP Exams

<i>Subject</i>	<i>Score</i>	<i>Advanced Placement (AP) Credit</i>	<i>Placement</i>
Arabic			Department of Near Eastern Studies determines credit and placement based on departmental examination.
Biology			see www.biology.cornell.edu for credit and placement information.
Chemistry	5	4 credits	Department determines placement on basis of student/advisor meeting before registration and/or an exam given during fall orientation. Placement out of 2070, 2080, or 2090; if students take 2150 they may also receive 4 AP credits. Pre-med students with AP credit should contact the Health Careers Center to determine how many general chemistry courses they should take. A few medical schools require two semesters of general chemistry; they do not accept AP credit as one of the required courses.
Computer science AB	4,5	4 credits	Placement out of CS 1110. Department offers placement exam during fall orientation.
Computer science A	5	4 credits	Placement out of CS 1110. Department also offers placement exam during fall orientation.
Economics, micro	4,5	3 credits	Placement out of ECON 1110 and HADM 1141.
Economics, macro	4,5	3 credits	Placement out of ECON 1120.
English literature and composition			varies by college
English language and composition			varies by college
Environmental science	4,5	3 credits	Placement out of EAS 1101 and NTRES 2010. (Engineering and BEE students receive no credit.)
French language	4,5	3 credits	Department of Romance Studies determines placement. Students should take the CASE† to obtain appropriate placement.
French literature	4,5	3 credits	Department of Romance Studies determines placement. Students should take the CASE† to obtain appropriate placement.
German	4,5	3 credits	Department of German Studies determines credit and placement. Students should take the CASE† to obtain appropriate placement.
Government and politics, U.S.	4,5	3 credits	Placement out of GOVT 1111.
Government and politics, comparative	4,5	3 credits	Placement out of GOVT 1313.
Greek, Ancient			Department of Classics determines credit and placement based on departmental examination.
Greek, Modern			Department of Classics determines credit and placement based on departmental examination.
Hebrew			Department of Near Eastern Studies determines credit and placement based on departmental examination.
American history	4,5	4 credits	Placement out of HIST 1530 (also AMST 1530) and 1531 (also AMST 1531).
European history	4,5	4 credits	Placement out of HIST 1510 and 1520.
Human geography		no credit	
Italian language	4,5	3 credits	Department of Romance Studies determines placement. Students should take the CASE† to obtain appropriate placement.
Italian literature	4,5	3 credits	Department of Romance Studies determines placement. Students should take the CASE† to obtain appropriate placement.
Latin			Department of Classics determines credit and placement based on departmental examination.

CEEB's AP Exams *(continued)*

<i>Subject</i>	<i>Score</i>	<i>Advanced Placement Credit</i>	<i>Placement</i>
Mathematics BC	4,5	8 credits	Placement out of MATH 1106, 1110, 1120, 1220, and 1910. Permission to take MATH 2210, 2230, 2130, or 2310. Students wishing to take engineering calculus will place into MATH 1920.
	3	4 credits	Placement out of MATH 1106 and 1110. Permission to take MATH 1120, 1220, 1910, or 2310.
Mathematics AB or AB subscore of BC exam	3,4,5	4 credits	Placement out of MATH 1106 and 1110. Permission to take MATH 1120, 1220, 1910, or 2310.
Music			Department of Music determines credit and placement based on departmental examination.
Persian			Department of Near Eastern Studies determines credit and placement based on departmental examination.
Physics B	5	8 credits	Placement out of PHYS 1101–1102. Students who also have a score of 4 or 5 on Mathematics BC may choose to accept 4 AP credits for 2207 or 1112 and then take 2208 or 2213. Students in the College of Engineering should refer to www.engineering.cornell.edu/student-services/academic-advising/academic-information/ap-credit/index.cfm for credit and placement information.
	4	4 credits	Placement out of PHYS 1101. (Students may receive credit for only one of the courses in each group: [PHYS 1101, 1112, 1116, 2207] OR [PHYS 1102, 2208, 2213, 2217].)
Physics C–Mechanics	4,5	4 credits	Placement out of PHYS 1112 or 2207, or placement into PHYS 1116 with no AP credit. For more information, contact department representative. (Students may receive credit for only one of the courses in each group: [PHYS 1101, 1112, 1116, 2207] OR [PHYS 1102, 2208, 2213, 2217].)
Physics C–Electricity/Magnetism	5	4 credits	Placement out of PHYS 2213. (Students may receive credit for only one of the courses in each group: [PHYS 1101, 1112, 1116, 2207] OR [PHYS 1102, 2208, 2213, 2217].)
Psychology	4,5	3 credits	Placement out of PSYCH 1101.
Spanish language	4,5	3 credits	Department of Romance Studies determines placement. Students should take the CASE† to obtain appropriate placement.
Spanish literature	4,5	3 credits	Department of Romance Studies determines placement. Students should take the CASE† to obtain appropriate placement.
Statistics (excluding engineering students)	4,5	4 credits	Placement out of AEM 2100, PAM 2100, ILRST/STSCI 2100, or MATH 1710 (not HADM 2201).
Studio art		no credit	
Turkish			Department of Near Eastern Studies determines credit and placement based on departmental examination.
World history		no credit	

†Cornell Advanced Standing Examination. Contact Callean Hile, 303 Morrill Hall, for French, Italian, and Spanish. Contact Miriam Zubal, 183 Goldwin Smith Hall, for German.

Subject	Marks	Credit
International Baccalaureate (IB) Higher-Level Examinations are awarded advanced standing and credit on receipt of the examination results from the I.B. Office.		
Anthropology		subject to departmental review
Biology		see www.biology.cornell.edu
Chemical and Physical Systems	6 or 7	8 credits (PHYS 1101 and 1102)
Chemistry	6 or 7	4 credits (CHEM 2070 or 2090)
Computer Science	6 or 7	4 credits (CS 1110)
Economics	6 or 7	6 credits (ECON 1110 and 1120)
English Literature	7	3 credits and placement out of one first-year writing seminar
	6	3 credits (excluding Arts and Sciences students)
History	6 or 7	4 credits
Mathematics	6 or 7	4 credits and placement out of MATH 1106 and 1110. Students may obtain more credit by taking the Mathematics Department placement exam during orientation week. (Engineering and BEE students receive no credit.)
Music		by departmental examination
Philosophy	7	subject to department review
Physical Science	6 or 7	8 credits (4 credits, CHEM 2060; 4 credits, PHYS 1010)
Physics	6 or 7	4 credits (PHYS 1101, 1112, or 2207). (Students may receive credit for only one of the courses in each group: [PHYS 1101, 1112, 1116, 2207] OR [PHYS 1102, 2208, 2213, 2217].)

General Certificate of Education (GCE) Advanced (“A”) Level Examination are awarded advanced standing and credit. Students must present the original or a certified copy of their examination certificate to receive credit.

Biology	see www.biology.cornell.edu	
Chemistry	A	8 credits (CHEM 2070 or 2090 and 2080)
	B	4 credits (CHEM 2070 or 2090)
Economics	A	6 credits (ECON 1110 and 1120)
English Literature	A	3 credits and placement out of one first-year writing seminar
	B	3 credits (excluding Arts and Sciences students)
Mathematics	A, B, or C	4 credits and placement out of MATH 1106 and 1110. Students may obtain more credit by taking the Mathematics Department placement exam during orientation week. Students who take the A level exam in Singapore will receive 8 credits and placement out of MATH 1106, 1110, 1120, 1220, and 1910. (Engineering and BEE students receive 4 credits.)
		4 additional credits for PHYS 2213 are granted for a combination of grades of A or B and a minimum of 8 advanced placement or advanced standing credits in mathematics. Students planning to major in physics are encouraged to enroll in PHYS 1116. Students taking 1116 do not receive 4 credits for 1112. Students taking 2217 do not receive credit for 2213. Students in the College of Engineering should refer to www.engineering.cornell.edu/student-services/academic-advising/ap-credit/index.cfm for credit and placement information.
Music		by departmental examination
Philosophy	A or B	subject to department review
Physics	A or B	4 credits for PHYS 1101, 1112, or 2207.

SUPPLEMENTARY INFORMATION

Chemistry and Chemical Biology

The Department of Chemistry and Chemical Biology offers two 8-credit sequences that satisfy prerequisites for further work in the department: CHEM 2070–2080 (2090 for engineering students) and 2150–2160. CHEM 2150–2160 is intended for students with a solid background in chemistry and strong math skills.

Freshmen may qualify for advanced placement and advanced standing credits in chemistry by satisfactory performance on the CEEB Advanced Placement Examination or an international examination, or by passing an advanced standing examination offered by the department. A score of 5 on the CEEB examination entitles a student to 4 credits. A student may earn 4 or 8 credits by suitable performance on the departmental examinations. To take the departmental

examinations (exams are offered at the beginning of each semester), students must sign up beforehand in the Chemistry and Chemical Biology Office of Undergraduate Studies, 131 Baker Laboratory, or online at www.chem.cornell.edu/cref/advplreg.aspx.

The specific course in which a student will register after having received a certain advanced placement standing will be decided by consultation between the student, his or her advisor, and the professors teaching the courses. Questions may also be directed to the director of undergraduate studies, in G50 Baker Laboratory. Students receiving advanced placement who are interested in a major in chemistry or a related science should consider taking CHEM 2150–2160 and should consult the CHEM 2150 instructor or department staff.

Computer Science

Students who receive a score of 4 or 5 on the AB version of the CEEB Advanced Placement

Examination in computer science, a score of 5 on the A exam, or a score of 6 or 7 on the IB exam will receive 4 advanced placement credits and may take CS 2110. These credits may be used to satisfy the requirement in computer programming for students in the College of Engineering.

Freshmen may also earn 4 credits by suitable performance on a departmental examination, given during Orientation Week. To take the departmental examination, students need only show up at the time and location indicated on the Orientation Week Schedule; advanced sign-up is not necessary.

Mathematics (Calculus)

For guidance in selecting an appropriate course, please consult *First Steps in Math*, published on the Mathematics Department web site (www.math.cornell.edu) under Courses.

The calculus courses MATH 1110, 1120, and 1910 cover substantially the same topics as calculus courses given in many high schools, and it is best to avoid repeating material that has already been covered at an appropriate level. Secondary-school students who have had the equivalent of at least one semester of calculus should, if possible, take one of the CEEB's two Advanced Placement Examinations (Calculus AB or Calculus BC) during their senior year.

The Department of Mathematics offers a placement examination during orientation week that covers the material of the AP Calculus program. The department exam should be taken by

1. students who have had at least a semester of calculus but did not take a CEEB Advanced Placement Examination; or
2. students who believe that their placement is incorrect.

Students are strongly urged to take the departmental placement exam even if they feel that their grasp of the material is uncertain. The placement information is useful in any case, and the grade on the test does not become a part of the student's record. No advance registration for the departmental examination is necessary. (A separate placement exam for students in the College of Engineering or the BEE program will be announced during the academic briefings.)

Students who have been awarded advanced placement credit for calculus may not also receive academic credit for similar courses taken at Cornell.

Students who are in neither the College of Engineering nor in the Biological and Environmental Engineering (BEE) program of the College of Agriculture and Life Sciences. Students who have 4 AP credits for calculus will forfeit those credits if they take MATH 1106 or 1110. Students who have 8 AP credits for calculus will forfeit 4 credits if they take MATH 1120, 1220, or 1910 and all 8 credits if they take MATH 1106 or 1110.

Students in the College of Engineering or the Biological and Environmental Engineering (BEE) program of the College of Agriculture and Life Sciences.

Engineering students will take the engineering calculus sequence, which assumes students have one semester of calculus experience before entering Cornell. Because the engineering sequence is more advanced than other sequences at Cornell, engineering students may receive at most 4 AP credits, which they will forfeit if they take MATH 1910, the first course in the sequence.

Modern Foreign Languages

Students who have studied a language for two or more years and want to continue study in that language at Cornell must present the results of a placement test. See "Placement Tests and Advanced Placement Credit" under "Foreign Language Requirements" in the College of Arts and Sciences section of this catalog. Students whose SAT II or AP scores are two years old or more, or who have had a year of formal study or substantial informal study since they last took a placement test should take the Cornell placement test again during orientation week if they plan to continue course work.

Advanced standing credit may be earned as follows:

1. Students with a score of 4 or 5 on the language Advanced Placement Examination of the CEEB earn 3 credits and are eligible to take the Cornell Advanced Standing Examination (CASE).
2. Students who achieve a minimum score of 65 on the Cornell language placement test given during orientation week are eligible to take the Cornell Advanced Standing Examination (CASE). Outstanding performance on this examination can result in a maximum of 3 credits.
3. For formal language work done after high school at an accredited college, credit is considered by the relevant department on submission of a syllabus and transcript. Note that credit transfer and placement are the result of different processes. Students wishing to enroll in a language course at Cornell are required to take the placement test.
4. Native speakers of languages other than English may, if an examination by the appropriate department is available, be granted a maximum of 3 credits in a foreign language.

Information about times and places of placement tests is available in the orientation booklet and from Academic and Career Counseling Services at sao.cornell.edu/orientation/placement.htm. For more information, see "College of Arts and Sciences" on language course placement, or contact Callean Hile, 303 Morrill Hall, for French, Italian, and Spanish (placement tests in French, Italian, and Spanish are available at collt.lrc.cornell.edu); Miriam Zubal, 183 Goldwin Smith Hall, for German; Doreen Silva, 226 Morrill Hall, for Russian; Kim Robinson, 388 Rockefeller Hall, for Asian languages, Nava Scharf, 409 White Hall, for Hebrew; or Munther Younes, 409 White Hall, for Arabic.

Music

Advanced placement and credit are awarded only in music theory, and only on the basis of an examination administered by the Department of Music; that is, credit cannot be earned on the basis of the AP, IB, or other examinations from outside Cornell, nor on the basis of course work done elsewhere. Outstanding performance on the departmental examination will earn students 3 credits and placement directly into MUSIC 2102. In rare instances students may place into MUSIC 3101, in which case they will earn 6 credits. The placement examination is normally administered on the Sunday during fall orientation week and, when necessary, at the beginning of the spring semester. For more information about the examination, see the departmental web site.

Physics

Advanced placement and credit are awarded on the basis of the CEEB Advanced Placement Examination in physics (Physics B or Physics C), certain international examinations, or the departmental examination (offered only during orientation week, fall semester; appointment required). For information about the departmental examination, consult the director of undergraduate studies, 115 Clark Hall (physicsdus@cornell.edu).

Physics B—Students earning a score of 5 may receive 8 credits for non-calculus-based PHYS 1101 and 1102. Those earning a score of 5 in Physics B and a score of 4 or 5 in Calculus BC may choose to accept 4 credits in calculus-based PHYS 1112 or 2207 instead of 8 credits in PHYS 1101 and 1102. Those earning a score of 4 may receive 4 credits in PHYS 1101. Students in the College of Engineering should refer to www.engineering.cornell.edu/student-services/academic-advising/academic-information/ap-credit/index.cfm.

Physics C—Mechanics: Students earning a score of 4 or 5 may receive 4 credits for PHYS 1112 or 2207, or placement into PHYS 1116, a more analytic first-semester course, with no AP credit.

Physics C—Electricity and Magnetism: Students earning a score of 5 may receive 4 credits for PHYS 2213.

Students will not receive credit for an advanced placement course if they receive credit for a Cornell course with similar content. Students may receive credit for only one of the courses in each group:

PHYS 1101, 1112, 1116, 2207

PHYS 1102, 2208, 2213, 2217

A student planning a major in physics or applied and engineering physics and who is eligible for AP credit should consult with his or her advisor or the department representative.

Advanced placement into a next-in-sequence course depends on the completion of the appropriate mathematics prerequisites before enrolling. To qualify for advanced placement credit, it is not necessary to continue the study of physics.

General information and advice may be obtained from the director of undergraduate studies, 115 Clark Hall, or from the Department of Physics, 109 Clark Hall.

Statistics

Students who have been awarded advanced placement credit for statistics may not also receive academic credit for similar courses taken at Cornell. In particular, they will forfeit those credits if they take AEM 2100, HADM 2201, ILRST/STSCI 2100, MATH 1710, or PAM 2100.

Course Enrollment

PREENROLLMENT

Course enrollment for each semester at Cornell takes place partway through the preceding semester using an online application through *Student Center*. Dates are announced in advance and are posted on *Student Center*. Students are expected to meet with their faculty advisors before this period to affirm that the courses they plan to take will ensure satisfactory progress toward a degree.

New students and transfer students may be sent course enrollment instructions by their college offices before they arrive on campus. Procedures vary from college to college.

COURSE ADD/DROP/CHANGE

Students may adjust their schedules during add/drop/change periods. Courses may be added, dropped, or changed online through *Student Center*. Permission-only courses and courses with specific add/drop procedures will be handled using a written add/drop form. The form is completed by the student and signed by both the student's advisor and an appropriate representative of the department offering the course (an instructor, department staff member, or college registrar, depending on the college). The completed and signed form must be returned to the student's college office to be processed. Professional schools, the School of Continuing Education and Summer Sessions, the Department of Physical Education and Athletics, and First-Year Writing Seminars have different course enrollment and add/drop policies. See the chart below for their course add/drop/change fees.

Late Course Enrollment and Late Add/Drop/Change Fees

Academic Unit	Late Course Enrollment Fee	Late Course Add/Drop/Change Fee
Continuing Education and Summer Sessions	†	
Johnson Graduate School of Management	\$100	\$100
Law School	No fee	No fee
Physical education	\$30	\$20*
Veterinary medicine	\$100*	\$100*

†Consult the Summer Session catalog and the Division of Extramural Study brochure for fees.

*Consult the college office for special considerations and requirements.

EXPLANATION OF COURSE NUMBERING SYSTEMS AND SUBJECT CODES

1100 level—introductory course, no prerequisites, open to all qualified students

2000 level—lower-division course, open to freshmen and sophomores, may have prerequisites

3000 level—upper-division course, open to juniors and seniors, prerequisites

4000 level—upper-division course, open to seniors and graduate students

5000 level—professional level (e.g., management, law, veterinary medicine)

6000 level—professional and graduate-level course, open to upper-division students

7000 level—graduate-level course

8000 level—master's level, thesis, research

9000 level—doctoral level, thesis, research

The list of courses that follows is arranged in two broad groups.

Group 1: Divisions that offer both undergraduate- and graduate-level courses

Agriculture and Life Sciences

Architecture, Art, and Planning

Arts and Sciences

Engineering

Hotel Administration

Human Ecology

Industrial and Labor Relations

Nutritional Sciences

Officer Education

Group 2: Graduate professional divisions

Law

Management

Veterinary Medicine

No courses are offered by the Graduate School as a unit; graduate-level courses are contained in the various departments that offer the instruction.

Within each division, courses are generally arranged in alphabetical order by department and in numerical order within the departments. All courses are briefly described for those divisions (group 1) offering instruction to both undergraduate and graduate students. Courses in the graduate professional divisions (group 2) are designated by number and title only.

Subject Codes and Their Meanings

AAP Architecture, Art, and Planning

AAS Asian American Studies

AEM Applied Economics and Management

AEP Applied and Engineering Physics

AGSCI Agricultural Sciences

AIRS Aerospace Studies

AIS American Indian Studies

ALS Agriculture and Life Sciences

AMST American Studies

ANSC Animal Science

ANTHR Anthropology

ARCH Architecture

ARKEO Archaeology

ART Art

ARTH History of Art

ASIAN Asian Studies

ASRC Africana Studies and Research Center

ASTRO Astronomy

BEE Biological and Environmental Engineering

BENGL Bengali

BIOAP Animal Physiology and Anatomy

BIOBM Biochemistry, Molecular and Cell Biology

BIOEE Ecology and Evolutionary Biology

BIOG Biology: General Courses

BIOGD Genetics and Development

BIOMB Environmental Science Marine Biology Laboratory

BIOMI Microbiology

BIOMS Biomedical Sciences

BIONB Neurobiology and Behavior

BIOPL Plant Biology

BIOSM Shoals Marine Laboratory

BME Biomedical Engineering

BSOC Biology and Society

BTRY Biometry and Statistics

BURM Burmese

CAPS China and Asia Pacific Studies

CATAL Catalan

CEE Civil and Environmental Engineering

CHEM Chemistry

CHEME Chemical and Biomolecular Engineering

CHIN Chinese

CHLIT Literature in Chinese

CIS Computing and Information Science

CLASS Classics

COGST Cognitive Science

COML Comparative Literature

COMM Communication

CRP City and Regional Planning

CS Computer Science

CSS Crop and Soil Sciences

CZECH Czech

DANCE Dance

DEA Design and Environmental Analysis

DSOC Development Sociology

DUTCH Dutch

EAS Earth and Atmospheric Sciences

ECE Electrical and Computer Engineering

ECON Economics

EDUC Education

ENGL English

ENGLF English for Academic Purposes

ENGR Communications

ENGRD Engineering Distribution Courses

ENGRG Engineering General Interest

ENGRI Introduction to Engineering Courses

ENTOM Entomology

FDSC Food Science

FGSS Feminist, Gender, and Sexuality Studies

FILM Film Studies

FRDR Freehand Drawing and Scientific Illustration

FREN French

FSAD Fiber Science and Apparel Design

GERST German Studies

GOVT Government

GRAD Graduate School

GREEK Greek

HADM Hotel Administration

HD Human Development

HE Human Ecology Interdepartmental

HINDI Hindi

HIST History

HORT Horticulture

HUNGR Hungarian

IARD	International Agriculture and Rural Development
ILRCB	Collective Bargaining, Labor Law, and Labor History
ILRHR	Human Resources Studies
ILRIC	International and Comparative Labor
ILRID	Industrial and Labor Relations Interdepartmental
ILRLE	Labor Economics
ILROB	Organizational Behavior
ILRST	Social Statistics
INDO	Indonesian
INFO	Information Science
ITAL	Italian
JAPAN	Japanese
JAVA	Javanese
JPLIT	Literature in Japanese
JWST	Jewish Studies
KHMER	Khmer (Cambodian)
KOREA	Korean
KRLIT	Korean Literature
LA	Landscape Architecture (Agriculture and Life Sciences)
LANAR	Landscape Architecture (Architecture, Art, and Planning)
LATA	Latin American Studies
LATIN	Latin
LAW	Law
LING	Linguistics
LSP	Latino Studies Program
MAE	Mechanical and Aerospace Engineering
MATH	Mathematics
MEDVL	Medieval Studies
MILS	Military Science
MSE	Materials Science and Engineering
MUSIC	Music
NAVS	Naval Science
NBA	Business Administration
NCC	Graduate School of Management Common Course
NEPAL	Nepali
NES	Near Eastern Studies
NMI	Graduate School of Management, Research and Advanced Studies
NRE	Graduate School of Management, Doctoral Seminars
NS	Nutritional Sciences
NSE	Nuclear Science and Engineering
NTRES	Natural Resources
ORIE	Operations Research and Information Engineering
PALI	Pali
PAM	Policy Analysis and Management
PE	Physical Education
PHIL	Philosophy
PHYS	Physics
PLBR	Plant Breeding
PLPA	Plant Pathology

POLSH	Polish
PORT	Portuguese
PSYCH	Psychology
QUECH	Quechua
RELST	Religious Studies
ROMS	Romance Studies
RUSSA	Russian
RUSSL	Literature in Russian
SANSK	Sanskrit
SEBCR	Serbo-Croatian
SHUM	Society for the Humanities
SINHA	Sinhala
SNES	Science of Natural and Environmental Systems
SNLIT	Literature in Sanskrit
SOC	Sociology
SPAN	Spanish
STS	Science and Technology Studies
STSCI	Statistical Science
SWED	Swedish
TAG	Tagalog
TAM	Theoretical and Applied Mechanics
THAI	Thai
THETR	Theatre Arts
TOX	Toxicology
UKRAN	Ukrainian
URDU	Urdu
VETCS	Clinical Sciences
VETMI	Microbiology and Immunology
VETMM	Molecular Medicine
VIEN	Viticulture and Enology
VIET	Vietnamese
VISST	Visual Studies
VTBMS	Biomedical Sciences
VTLIT	Literature in Vietnamese
VTMED	Veterinary Medicine Interdisciplinary
VTPMD	Population Medicine and Diagnostic Sciences

Class Attendance, Meeting Times, and Examinations

CLASS ATTENDANCE AND MEETING TIMES

Students are expected to be present throughout each semester at all meetings of courses for which they are registered. The right to excuse a student from class rests at all times with the faculty member in charge of that class.

Absences because of religious beliefs. In accordance with Section 224-a of the New York State Education Law, each student who is absent from school because of his or her religious beliefs must be given an equivalent opportunity to register for classes or make up examinations, study, or work requirements that he or she may have missed because of such absence on any particular day or days. No fees of any kind shall be charged by the university

for making available to such student such equivalent opportunity.

Class Meeting Times

Monday/Wednesday

	Start Times	End Times
50 MIN	08:00 A.M.	08:50 A.M.
75 MIN	08:40 A.M.	09:55 A.M.
50 MIN	09:05 A.M.	09:55 A.M.
50 MIN	10:10 A.M.	11:00 A.M.
50 MIN	11:15 A.M.	12:05 P.M.
50 MIN	12:20 P.M.	01:10 P.M.
50 MIN	01:25 P.M.	02:15 P.M.
50 MIN	02:30 P.M.	03:20 P.M.
75 MIN	02:55 P.M.	04:10 P.M.
50 MIN	03:35 P.M.	04:25 P.M.
50 MIN	07:30 P.M.	08:20 P.M.
75 MIN	07:30 P.M.	08:45 P.M.
50 MIN	08:35 P.M.	09:25 P.M.

Tuesday/Thursday

50 MIN	08:00 A.M.	08:50 A.M.
75 MIN	08:40 A.M.	09:55 A.M.
50 MIN	09:05 A.M.	09:55 A.M.
50 MIN	10:10 A.M.	11:00 A.M.
75 MIN	10:10 A.M.	11:25 A.M.
50 MIN	11:15 A.M.	12:05 P.M.
75 MIN	11:40 A.M.	12:55 P.M.
50 MIN	12:20 P.M.	01:10 P.M.
50 MIN	01:25 P.M.	02:15 P.M.
75 MIN	01:25 P.M.	02:40 P.M.
50 MIN	02:30 P.M.	03:20 P.M.
75 MIN	02:55 P.M.	04:10 P.M.
50 MIN	03:35 P.M.	04:25 P.M.

NO EVENING CLASSES

Friday

50 MIN	08:00 A.M.	08:50 A.M.
50 MIN	09:05 A.M.	09:55 A.M.
50 MIN	10:10 A.M.	11:00 A.M.
50 MIN	11:15 A.M.	12:05 P.M.
50 MIN	12:20 P.M.	01:10 P.M.
50 MIN	01:25 P.M.	02:15 P.M.
50 MIN	02:30 P.M.	03:20 P.M.
50 MIN	03:35 P.M.	04:25 P.M.

NO EVENING CLASSES

Laboratories and similar exercises

1 HR 55 MIN	08:00 A.M.	09:55 A.M.
	10:10 A.M.	12:05 P.M.
	12:20 P.M.	02:15 P.M.
	02:30 P.M.	04:25 P.M.
(Mon. and Wed.)	07:30 P.M.	09:25 P.M.
2 HR 25 MIN	07:30 A.M.	09:55 A.M.
	10:10 A.M.	12:35 P.M.
	02:00 P.M.	04:25 P.M.
(Mon. and Wed.)	07:30 P.M.	09:55 P.M.
3 HR	08:00 A.M.	11:00 A.M.
	10:10 A.M.	01:10 P.M.
	01:25 P.M.	04:25 P.M.
(Mon. and Wed.)	07:30 P.M.	10:30 P.M.

On Monday, Tuesday, Wednesday, and Thursday the hours of 4:25 P.M. to 7:30 P.M., on Fridays the hours after 4:25 P.M., on Saturday the hours after 12:05 P.M., and all day Sunday shall be free from all formal undergraduate classes or laboratory exercises.

Evening preliminary examinations that will be given outside of normal class hours may be scheduled on Tuesday and Thursday evenings only, beginning at 7:30 P.M. All room assignments are scheduled by the Office of the University Registrar. The dates and times of these examinations are listed in the course rosters for each semester.

Evening academic activities commencing at 7:30 P.M. on Mondays and Wednesdays, other than regularly scheduled courses and prelims previously approved by the office of the university faculty, are not permitted. Violation of these rules interferes with other university activities (e.g., athletic, musical, theatrical, or employment).

Any exception to the above regulations, other than those for evening preliminary examinations, will require permission of the dean or director of the college or school offering the course. Exceptions to the regulations on evening preliminary examinations require approval of the dean of the university faculty. All such exceptions must include provision of special arrangements for the students for whom conflicts are generated by such an exception.

FINAL EXAMINATIONS

Final examinations for undergraduate courses are scheduled by the Office of the University Registrar. Examinations may be one, two, or two and one-half hours in length at the discretion of the department concerned. The schedule of final examinations is available online at www.cornell.edu/academics/courses.cfm.

General Rules Governing Final Examinations

Legislation of the university faculty governing study periods and examinations is as follows:

1. No final examinations can be given at a time other than the time appearing on the official examination schedule promulgated by the Office of the University Registrar without prior written permission of the dean of the faculty.
2. No permission will be given, for any reason, to schedule final examinations during the last week of classes or the designated study period preceding final examinations.
3. Permission will be given by the dean of the faculty to offer an alternate examination during the examination period itself if requested in writing by the faculty member, but only on condition that a comparable examination also be given for those students who wish to take it at the time the examination was originally scheduled. The faculty member requesting such a change shall be responsible for making appropriate arrangements for rooms or other facilities in which to give the examination. This should be done through the university registrar's office.
4. No tests are allowed during the last week of scheduled classes unless such tests are

part of the regular week-by-week course program and are followed by an examination (or the equivalent) during the final examination period.

5. Papers may be required of students during the study period if announced sufficiently far in advance that the student did not have to spend a significant segment of the study period completing them.
6. Faculty can require students to submit papers during the week preceding the study period.
7. Take-home examinations should be given to classes well before the end of the regular semester and should not be required to be submitted during study period but rather well into the examination period.

The university policies governing study period and final examinations are:

1. Each course should require that a final examination or some equivalent exercise (for example, a term paper, project report, final critique, oral presentation, or conference) be conducted or due during the period set aside for final examinations.
2. Although not specifically prohibited, it is university policy to discourage more than two examinations for a student in one 24-hour time period and especially on any one day. It is urged that members of the faculty consider student requests for a make-up examination, particularly if their course is the largest of the three involved and thus has the strongest likelihood of offering a make-up for other valid reasons, such as illness or death in the family.
3. Students have a right to examine their corrected exams, papers, etc., to be able to question their grading. (Note that students have no absolute right to the return thereof.) Exams, papers, etc., as well as grading records, should be retained for a reasonable time after the end of the semester, preferably till the end of the following semester, to afford students such right of review.

EVENING PRELIMINARY EXAMINATIONS

The most convenient times and places for "prelims" are the normal class times and classrooms. In cases where the only alternative is to hold evening preliminary examinations, they may be scheduled only on Tuesday and Thursday evenings and only after 7:30 P.M.

An alternative time to take the examination *must* be provided for those students who have academic, religious, athletic, or employment conflicts at the time scheduled.

Note that instructors holding evening examinations are strongly urged to indicate this in the course descriptions listed in *Courses of Study* and *must* notify students of the dates of such examinations as early as possible in the semester, preferably when the course outline is distributed. For more information on the policy governing evening examinations, contact the office of the dean of the faculty, 315 Day Hall.

Grading Guidelines

The official university grading system is composed of letter grades with pluses and minuses. Passing grades range from A+ to D-; F is failing. INC denotes a grade of incomplete, and R is the grade given at the end of the first semester of a yearlong course. The grades of INC and R do not have quality-point equivalents attached. These are the quality-point equivalents:

A+ =4.3	B+ =3.3	C+ =2.3	D+ =1.3
A =4.0	B =3.0	C =2.0	D =1.0
A- =3.7	B- =2.7	C- =1.7	D- =0.7
			F =0.0

This is how a semester average is computed:

Course	Grade	Points	Quality Credits	Product
CHEM 103	B+	3.3	x 3	= 9.9
ENGL 151	C-	1.7	x 3	= 5.1
DEA 145	B	3.0	x 4	= 12.0
PAM 100	B	3.0	x 3	= 9.0
DEA 111	C	2.0	x 3	= 6.0
<i>Total</i>			16	42.0

To arrive at the semester average, add the products (credits x quality points) and divide by the number of credits taken. Here, 42 divided by 16 equals 2.63.

The cumulative average (an average of grades from two or more semesters) equals the sum of the products of all the grades at Cornell divided by the total number of credits taken.

S-U GRADES

On September 6, 1972, the Faculty Council of Representatives passed the following legislation:

"Resolved, that:

- a. the S-U system have symbol equivalents which are uniform within the university; S means C- or above; U means D+, D, D-, or failure.
- b. S-U options be chosen by the student during the first three weeks of the semester.
- c. the Announcements and/or supplementary course registration materials describing each course include a description of the course grading options, particularly if the course is graded with an exclusive S-U. Any change in grading options must be announced by the instructor within the first two weeks of the semester.
- d. course requirements (required reading, term paper, etc.) be the same for students electing S-U grades as for those electing letter grades."

The rules for the S-U option are further defined by each of the academic units. They are as follows:

Agriculture and Life Sciences. (1) Must have 100 credit hours with A, B, C, D grades (prorated for transfer students). (2) The S-U option is available only in those courses so designated in the course catalog after approval by the Educational Policy Committee. (3) Freshmen are limited to one optional S-U per semester.

Architecture, Art, and Planning. (1) All courses specifically required for a degree excluded. Various departments may designate specific required courses where S-U will be permitted. (2) In a course designated as S or U, the entire class is so graded. The instructor must announce this decision within the first two weeks of class. (3) Where the option for S or U exists, both student and instructor must agree on the option. This agreement must be made by the end of the third week of classes on the appropriate form in the college office. Once agreed upon, this grade option will be used for the final grade.

Arts and Sciences. (1) Courses that count toward satisfaction of major requirements should not be taken for an S or U grade unless the department grants permission. (2) Permission of instructor. (3) A minimum of 80 of the 120 hours required for the A.B. degree must be in courses for which the student has received letter grades.

Engineering. (1) The course in question must be offered with an S-U option. (2) The student must have completed at least one full semester of study at Cornell. Freshmen may not take any courses on an S-U basis during their first semester with the exception of courses graded "S-U only" such as physical education, ROTC, supplemental courses, and writing workshops. (3) The proposed S-U course must count as either a liberal studies distribution or an approved elective in the Engineering curriculum. (4) Students may elect to enroll S-U in only one course each semester in which the choice between letter grade and S-U is an option. (Additional courses offered "S-U only" may be taken in the same semester as the "elected S-U" course.) (5) After the end of the third week of classes, the grading option may not be changed nor will students be permitted to add a course in which they were previously enrolled (in the current semester) under a different grading option. Note: Courses graded S-U do not count toward eligibility on the Dean's List and may weaken a student's chances for acceptance into graduate school. Questions regarding the S-U grading option should be addressed to Engineering Advising.

Graduate School. (1) Seminars and thesis research courses are usually graded S-U, and should be registered accordingly or a grade error results at semester's end. Other courses may be registered as S-U only if offered as S-U option.

Hotel. (1) A maximum of 4 S-U credit hours per semester, not including those only offered S-U, which may only be in non-career track courses (M.M.H.) or nonconcentration, non-hotel elective courses (B.S.). (2) A maximum of 6 credits total may be taken S-U toward distribution elective requirements.

Human Ecology. (1) Not part of student's major. (2) May be used in the 9 credit hours required outside the major in Human Ecology courses. (3) Not part of hours required in humanities, natural sciences, and social sciences. (4) A department may approve S-U grading in specific courses if approved by Educational Policies Committee. (5) Total of 12 credits in S-U courses (not counting physical education) may be counted toward degree requirements during a student's college career.

Industrial and Labor Relations. (1) This option may be elected, if available in ILR electives, or in out-of-college electives but not including directed studies. (2) Degree requirements

include a minimum of 105 letter grade (A+ to D-) credits. (3) Student must also be in good academic standing. (4) A U grade is considered the equivalent of an F in determining a student's academic status. (5) Limited to two courses per semester, not to exceed four hours in any one course.

Internal Transfer. (1) S-U grades permitted only when it is the only option or (2) when specifically approved by an admissions officer in the school or college to which the student plans to transfer.

Law. Each J.D. student, after the first year, may elect to take up to two upper-class courses on an S-U basis. Students must make this election in writing to the registrar's office within two weeks of the end of the add/drop period. If made, the election shall be irrevocable. Students may not make this election in courses that they use to satisfy the Law School's upper-class writing or professional responsibility requirements. Instructors may designate specific courses that they teach as not eligible for the S-U election.

Veterinary Medicine. (1) There is one foundation course in the veterinary curriculum that is offered on an S-U basis only. All required core foundation courses must be taken for a letter grade. (2) Elective courses for veterinary students may be offered on an S-U basis at the option of the professor. S-U optionally graded courses must be chosen within the add/drop deadline.

INCOMPLETE

The grade of incomplete is appropriate only when two basic conditions are met:

1. the student has a substantial equity at a passing level in the course with respect to work completed; and
2. the student has been prevented by circumstances beyond the student's control, such as illness or family emergency, from completing all of the course requirements on time.

A grade of incomplete may not be given merely because a student fails to complete all course requirements on time. It is not an option that may be elected at the student's own discretion.

While it is the student's responsibility to initiate a request for a grade of incomplete, reasons for requesting one must be acceptable to the instructor, who establishes specific make-up requirements. The instructor has the option of setting a shorter time limit than that allowed by the student's college for completing the course work. Several colleges require that a statement signed by the instructor be on file indicating the reason for the grade of incomplete and the restriction, if any.

It is the responsibility of the student to see that all grades of incomplete are made up before the deadline and that the grade has been properly recorded with the student's college registrar.

CHANGES IN GRADES

Changes in a grade may be made only if the instructor made an error in assigning the original grade.

OFFICIAL TRANSCRIPTS

An official transcript is one that bears the official signature of the university registrar, sent in a sealed envelope directly from the Office of the University Registrar to another institution or agency as directed by the student. Transcripts may be requested at registrar.sas.cornell.edu. There is no fee except for overnight and/or express mail services.

University Requirements for Graduation

The *university* has only two requirements for graduation that must be fulfilled: the swim test and physical education courses. A student's *college* determines degree requirements such as residency, number of credits, distribution of credits, and grade averages. See the individual requirements listed by each college or school or contact the college registrar's office.

STUDENT RESPONSIBILITIES

Students are responsible for meeting all requirements for the courses in which they are enrolled, as defined by the faculty members teaching the courses. It is also the student's responsibility to be aware of the specific major, degree, distribution, college, and graduation requirements for completing his or her chosen program of studies. Students should know how far they have progressed in meeting those requirements at every stage of their academic career.

PHYSICAL EDUCATION

Classes

All undergraduate students must complete two semesters of work in physical education unless exempted from this requirement for medical or other special reasons or by virtue of advanced standing on admission. For transfer students the requirement is reduced by the number of semesters satisfactorily completed, not necessarily including physical education, in a college of recognized standing before entering Cornell. Credit in physical education may be earned by participating in courses offered by the Department of Athletics and Physical Education, participating on an intercollegiate athletic team, or performing in the marching band.

Physical education is a requirement of the first two terms at Cornell. Students must register for it in each semester, except those in which postponements are granted, until the requirement is satisfied.

Temporary postponements may be granted on the basis of physical disability, schedule conflicts, or excessive work load (employment exceeding 20 hours per week). Gannett Health Services can provide certifications based on health, and the financial aid office can provide certifications of employment. Students should see the director or assistant director of Physical Education to establish postponements or waiver of the requirement. Questionable or unusual cases may be resolved by petition to the Faculty Advisory Committee on Athletics and Physical Education.

Swim Test

The Faculty Advisory Committee on Athletics and Physical Education has established a basic swimming and water safety competency requirement for all entering freshman undergraduate students. Normally, the test is given for women in the Helen Newman pool and for men in the Teagle pool as part of their orientation process. The test consists of a feet-first entry into the deep end of the pool and a continuous 75-yard swim using front, back, and optional strokes. Any student who cannot pass the swim test is required to include the course Beginning Swimming and Water Safety in his or her program of physical education before electives can be chosen. A swim test hold will be placed on the student's record until he or she has passed the swim test or fulfilled the requirement by satisfactory attendance in two semesters of Beginning Swimming and Water Safety. Students unable to meet the swim requirement because of medical, psychological, or religious reasons must petition the Faculty Advisory Committee on Athletics and Physical Education for a waiver of the requirement. When a waiver is granted by the Faculty Committee on Physical Education, an alternate requirement is imposed. The alternate requirement substitutes a course in either Certified First Responder, Emergency Medical Technician, or Wellness and Fitness for the original swimming requirement.

Internal Transfer Division

Students may not always be satisfied with the original Cornell school or college into which they've been admitted, and may decide to transfer from one college to another within the university. This process is called internal transfer, and application procedures and deadlines vary by college. It may be possible to be admitted directly into a new program. Students who are uncertain if they immediately qualify for direct transfer, however, should contact the Internal Transfer Division (ITD). Generally students whose current curriculum differs substantially from that of their target college, or students with below-average records, are not eligible for direct transfer but can apply for sponsorship to the ITD.

To apply for sponsorship, candidates must interview with the division's director and submit a copy of their target college's application for internal transfer to the ITD. In many cases, colleges formally sponsor students in ITD and essentially guarantee admission if students successfully complete the requirements (taking particular courses, earning a specified grade point average while enrolled in ITD) that are outlined in their letter of sponsorship. Students are encouraged to apply simultaneously for direct transfer and for sponsorship to ITD, so that if direct transfer is denied, their target college may offer the opportunity of being sponsored in the Internal Transfer Division. Tuition and fees for students sponsored in ITD are the same as those of the sponsoring college.

For more information about internal transfer requirements, students should contact the admissions office of their target college and the office of the Internal Transfer Division, 220 Day Hall (255-4386).

Service-Learning Course Guide

Service-learning courses at Cornell are offered from various colleges and disciplines to engage students, faculty, and community partners on issues relating to poverty, literacy, education, access, health care, immigration, hunger, affordable housing, environment, and others. Service-learning courses are academically rigorous and offer students opportunities to link theory and practice through structured public service activities in collaboration with local communities, and thus gain further understanding and appreciation of the discipline, while achieving an enhanced sense of civic responsibility.

Through Service-learning, students gain hands-on problem-solving skills, develop an aptitude for critical thinking, and become active citizens in our democratic society. The Cornell Public Service Center (PSC) serves as the hub of public service and civic engagement activities on campus.

For students and faculty members who are interested or engaged in public service, public scholarship, and civic engagement, the Public Service Center has developed a comprehensive list of Service-learning courses on campus. For more information, please visit www.psc.cornell.edu.

Interdisciplinary Centers, Programs, and Studies

ANDREW D. WHITE PROFESSORS-AT-LARGE

726 University Avenue (255-0832)
adwhiteprofessors.cornell.edu

The program has its origins in Cornell's early history. Andrew D. White, the first president of Cornell University, inaugurated the position of nonresident professor, to be held by eminent scholars, scientists, and intellectuals who periodically visit the university for the stated purpose of "contributing to the intellectual and cultural life of the university." Toward this end, Andrew D. White Professors-at-Large engage in a variety of activities including public lectures, ongoing courses, and collaborative research, as well as holding office hours for undergraduate and graduate students. They serve for a six-year term and are full members of the faculty when in residence.

Term Ending in 2010

Aldous, David, statistician
 Leeson, Lynn Hershman, digital artist
 Peskin, Charles, mathematician
 Sala, Osvaldo, ecologist
 Tibi, Bassam, Islamist

Term Ending in 2011

Sims, Lowery Stokes, art curator

Term Ending in 2012

Angier, Natalie, science writer

Term Ending in 2013

Lakhdar Brahimi, diplomat
 Sir Partha Dasgupta, economist
 Shri Kulkarni, astronomer

Ann Markusen, regional planner
 Laura Restrepo, writer, journalist, and activist

Term Ending 2014

Hélène Cixious, writer and literary theorist
 Hans Föllmer, mathematician
 Denise Riley, philosopher and poet

FRANK H. T. RHODES CLASS OF '56 UNIVERSITY PROFESSORSHIP

To commemorate their 40th reunion, the Class of 1956 initiated an endowment to create the Frank H. T. Rhodes Class of '56 University Professorship in honor of Cornell's ninth president (1977-1995). The purpose of the Rhodes Class of '56 Professorship is to strengthen the undergraduate experience by bringing to the university individuals from every walk of life who represent excellence of achievement and to create opportunities for interaction with undergraduates. The endowment also makes it possible to create public events related to the professorship such as lectures, performances, films, art exhibits, or conferences. Rhodes Class of '56 Professors are full members of the faculty while in residence. Appointments are awarded for a period of one to five years. During each year of their appointment, Rhodes Class of '56 Professors visit the campus for a week to engage in a variety of activities including public lectures, ongoing courses, and collaborative research.

Current Appointments

Eisenman, Peter, architect
 Grandin, Temple, associate professor of animal science
 Moses, Robert Parris, civil rights leader and founder of the Algebra Project
 Zinni, Anthony, USMC four-star general (retired)

CENTER FOR APPLIED MATHEMATICS

657 Frank H. T. Rhodes Hall (255-4335)

The Center for Applied Mathematics administers a broad-based interdepartmental graduate program that provides opportunities for study and research over a wide range of the mathematical sciences. Each student develops a solid foundation in analysis, algebra, and methods of applied mathematics. The remainder of the graduate student's program is designed by the student and his or her Special Committee. For detailed information on opportunities for graduate study in applied mathematics, students should contact the director of the Center for Applied Mathematics, 657 Frank H. T. Rhodes Hall.

There is no special undergraduate degree program in applied mathematics. Undergraduate students interested in an application-oriented program in mathematics may select an appropriate program in the Department of Mathematics, the Department of Computer Science, or some department of the College of Engineering.

Graduate students in the center take courses related to their program of study that are offered by various departments. Below are listed selected courses in applied mathematics in the main areas of research interest of the center's members. Detailed descriptions of these courses can be found in the listings of the individual departments.

Selected Applied Mathematics Courses

Basic Graduate Courses in Mathematics and Applied Mathematics

MATH 4130 Honors Introduction to Analysis I
 MATH 4140 Honors Introduction to Analysis II
 MATH 4330 Honors Linear Algebra
 MATH 4340 Honors Introduction to Algebra
 MATH 6110 Real Analysis
 MATH 6120 Complex Analysis
 MATH 6150 Mathematical Methods in Physics
 MATH 6210 Measure Theory and Lebesgue Integration
 MATH 6220 Applied Functional Analysis
 MATH 6310-6320 Algebra
 MATH 6330 Noncommutative Algebra
 MATH 6340 Commutative Algebra
 MATH 6510 Algebraic Topology
 MATH 6610 Geometric Topology
 TAM 6100, 6110 Methods of Applied Mathematics I, II, III
 TAM 6130 Asymptotics and Perturbation Methods

Analysis (and Differential Equations)

MATH 4280 Introduction to Partial Differential Equations
 MATH 6170 Dynamical Systems
 MATH 6180 Smooth Ergodic Theory
 MATH 6190-6200 Partial Differential Equations
 MATH 6520-6530 Differentiable Manifolds I and II
 MATH 6620 Riemannian Geometry
 MATH 7110-7120 Seminar in Analysis
 MATH 7130 Functional Analysis
 MATH 7150 Fourier Analysis
 MATH 7170 Applied Dynamical Systems

Logic and Theory of Computing

CS 5220 Applications of Parallel Computers
 CS 6766 Reasoning about Uncertainty
 CS 6810 Theory of Computing
 CS 7192 Seminar in Programming Refinement Logics
 MATH 4860 Applied Logic (also CS 4860)
 MATH 6810 Logic
 MATH 7810-7820 Seminar in Logic
 MATH 7830 Model Theory
 MATH 7840 Recursion Theory
 MATH 7870 Set Theory
 MATH 7880 Topics in Applied Logic

Numerical Mathematics and Operations Research

CS 4220 Numerical Analysis: Linear and Nonlinear Problems (also MATH 4260)
 CS 6210 Matrix Computations
 CS 6220 Sparse Matrix Computations
 CS 6240 Numerical Solution of Differential Equations
 CS 6670 Machine Vision
 CS 6820 Analysis of Algorithms
 MATH 4250 Numerical Analysis and Differential Equations (also CS 4210)
 ORIE 6335 Scheduling Theory
 ORIE 6300-6310 Mathematical Programming, I and II
 ORIE 6320 Nonlinear Programming
 ORIE 6325 Interior-Point Methods for Mathematical Programming

Discrete Mathematics and Geometry

MATH 4410 Introduction to Combinatorics I
 MATH 4420 Introduction to Combinatorics II
 MATH 4550 Applicable Geometry
 ORIE 6328 Convex Analysis
 ORIE 6330 Graph Theory and Network Flows
 ORIE 6336 Integer Programming

Information Communication and Control Theory

CHEME 4720 Feedback Control Systems (also ECE 4720, MAE 4780)
 ECE 4110 Random Signals in Communications and Signal Processing
 ECE 4250 Digital Signal Processing
 ECE 4670 Digital Communication Receiver Design
 ECE 5210 Theory of Linear Systems (also MAE 5210)
 ECE 5620 Fundamental Information Theory
 ECE 5640 Detection and Estimation
 ECE 5670 Digital Communications
 ECE 5800 Control and Optimization of Information Networks

Mathematical Biology

BIOEE 4600 Theoretical Ecology
 BTRY 6970 Individual Graduate Study in Biometry and Statistics

Mathematical Economics

ECON 6190 Econometrics I
 ECON 6200 Econometrics II
 ECON 7100 Stochastic Economics: Concepts and Techniques
 ECON 7170 Mathematical Economics
 ECON 7180 Topics in Mathematical Economics
 ECON 7190-7200 Advanced Topics in Econometrics

Mechanics and Dynamics

CHEME 7310 Advanced Fluid Mechanics and Heat Transfer
 CHEME 7510 Mathematical Methods of Chemical Engineering Analysis
 CHEME 7530 Analysis of Nonlinear Systems: Stability, Bifurcation, and Continuation
 MAE 6010 Foundations of Fluid Dynamics and Aerodynamics
 MAE 7340 Analysis of Turbulent Flows
 MAE 7370 Computational Fluid Mechanics and Heat Transfer
 TAM 5700 Intermediate Dynamics
 TAM 5780 Nonlinear Dynamics and Chaos
 TAM 6710 Hamiltonian Dynamics
 TAM 6720 Celestial Mechanics (also ASTRO 6579)
 TAM 6730 Mechanics of the Solar System (also ASTRO 6571)
 TAM 6750 Nonlinear Vibrations
 TAM 7510 Continuum Mechanics and Thermodynamics
 TAM 7520 Nonlinear Elasticity
 TAM 7760 Applied Dynamical Systems (also MATH 7170)

Probability and Statistics

ECE 4110 Random Signals in Communications and Signal Processing
 ECE 5620 Fundamental Information Theory
 ECE 5660 Fundamentals of Networks
 MATH 6710-6720 Probability Theory
 MATH 6740 Introduction to Mathematical Statistics
 MATH 7770-7780 Stochastic Processes
 ORIE 5560 Queuing Systems: Theory and Applications
 ORIE 5550 Applied Time-Series Analysis
 ORIE 6510 Probability
 ORIE 6540 Applied Stochastic Processes
 ORIE 6620 Advanced Stochastic Processes

ORIE 6700 Statistical Principles
 ORIE 6710 Intermediate Applied Statistics
 BTRY 4080 Theory and Probability
 BTRY 4090 Theory of Statistics

Robotics and Vision

CS 6670 Machine Vision
 ECE 5470 Computer Vision

Theoretical/Mathematical Physics/Chemistry

CHEM 7920 Molecular Collision Theory
 CHEM 7930 Quantum Mechanics I
 CHEM 7940 Quantum Mechanics II
 CHEM 7960 Statistical Mechanics
 CHEM 7980 Bonding in Molecules
 PHYS 6553-6554 General Relativity (also ASTRO 6509-6510)
 PHYS 6561 Classical Electrodynamics
 PHYS 6562 Statistical Mechanics
 PHYS 6572 Quantum Mechanics I
 PHYS 6574 Applications of Quantum Mechanics II
 PHYS 7651-7652 Relativistic Quantum Field Theory

MARIO EINAUDI CENTER FOR INTERNATIONAL STUDIES

170 Uris Hall (255-6370)

The Mario Einaudi Center for International Studies was established in 1961 to encourage and support comparative and interdisciplinary research on international subjects. Currently, it supports four U.S. Department of Education Title VI National Resource Centers and 15 other international programs. While some programs offer study of geographic regions, others focus on such topics as international agriculture, nutrition, population, law, planning, politics, rural development economics, and world peace. More than 800 faculty members voluntarily collaborate with the center and its associated programs. Undergraduate students may choose from a variety of minors such as international relations, Latin American studies, modern European studies, French studies, East Asian studies, South Asian studies, Southeast Asian studies, global health, or international agriculture and rural development.

In its ongoing effort to anticipate and respond to changing global circumstances and perspectives, the center applies its resources to new pilot activities and initiatives that bring faculty members and students together across traditional disciplines and departmental boundaries. As part of its Foreign Policy Initiative, the center has formed a network of 38 faculty members, brought experts to campus to speak on topical themes as part of a Distinguished Speaker Series, and provided seed funding for activities in foreign policy studies. The center also organizes semi-annual seed grant competitions for faculty and programs to advance international studies at Cornell and support faculty to mobilize additional external support.

Each year the center brings an eminent world leader to campus as the Henry E. and Nancy Horton Bartels World Affairs Fellow to deliver a public lecture, meet with classes, and interact informally with faculty members and students. The center also hosts a Current Events Roundtable each June that enables Cornell alumni to join faculty members in discussions of key world events.

Graduate students' overseas field research is supported through the center's annual travel grant competition as well as the Fulbright fellowship program and the Fulbright-Hays awards, which are both administered by the center.

Web sites of many international programs are hosted by the center along with the university's International Gateway (www.international.cornell.edu), a web site created by the center to showcase Cornell's international dimensions.

An undergraduate course, *Issues behind the News: An Interdisciplinary Analysis of International Current Events*, is coordinated by the center and offered by the Department of Government of the College of Arts and Sciences. The center invites faculty from across the university to deepen students' understanding of issues on the front pages of newspapers as events unfold during the semester.

For additional information on current programs, publications, and courses, contact:

Mario Einaudi Center for International Studies

Gilbert Levine, center interim director
David R. Lee, director of the international relations minor
170 Uris Hall
www.einaudi.cornell.edu

Berger International Legal Studies

John Barceló, program director
www.lawschool.cornell.edu/international

Comparative Economic Development Program

Kaushik Basu, program director
www.einaudi.cornell.edu/ced

Comparative Muslim Societies Committee

Eric Tagliacozzo, program director
www.einaudi.cornell.edu/cmcs

Comparative Societal Analysis Program

Valerie Bunce, program director
www.soc.cornell.edu/research/comparative.shtml

Cornell Food and Nutrition Policy Program

David Sahn, program director
www.nutrition.cornell.edu/grad/cfnpp.html

Cornell International Institute for Food, Agriculture, and Development

Alice Pell, program director
www.ciifad.cornell.edu

East Asia Program

Ding Xiang Warner, program director
www.einaudi.cornell.edu/eastasia

International Business Education Program

www.johnson.cornell.edu/research/international

Global Health Program

Rebecca Stoltzfus and Warren Johnson, program codirectors
www.human.cornell.edu/che/DNS/globalhealth

Institute for African Development

Muna Ndulo, program director
www.einaudi.cornell.edu/africa

Institute for European Studies

Christopher Anderson, program director
www.einaudi.cornell.edu/europe

International Political Economy Program

Tom Pepinsky, program director
www.einaudi.cornell.edu/ipep

International Programs in the College of Agriculture and Life Sciences

Ronnie Coffman, program director
www.ip.cals.cornell.edu

International Studies in Planning Program

William Goldsmith, program director
www.dcrp.cornell.edu/programs/isp.mgi

Latin American Studies Program

Deborah Castillo, program director
www.einaudi.cornell.edu/latinamerica

Peace Studies Program

Jonathan Kirshner, program director
www.einaudi.cornell.edu/peaceprogram

Population and Development Program

Thomas Hirschl, program director
www.einaudi.cornell.edu/pdp

South Asia Program

Dan Gold, program director
www.einaudi.cornell.edu/southasia

Southeast Asia Program

Thak Chaloeintiarana, program director
www.einaudi.cornell.edu/southeastasia

CENTER FOR THE STUDY OF INEQUALITY

363 Uris Hall
254-8674 (tel.)
inequality@cornell.edu
www.inequality.cornell.edu

The Center for the Study of Inequality (CSI) fosters basic and applied research on social and economic inequalities as well as the processes by which such inequalities change and persist. The study of inequality lies at the heart of current debates about segregation, affirmative action, the "glass ceiling," globalization, and any number of other contemporary policy issues. In recent years, public and scholarly interest in issues of inequality has intensified, not merely because of historic increases in income inequality in the United States and other advanced industrial countries, but also because inequalities of race, ethnicity, and gender are evolving in equally dramatic and complicated ways. The mission of CSI is to support research and teaching relevant to issues of inequality, to disseminate findings resulting from this research, and to otherwise facilitate the study of inequality in the United States and throughout the world.

Minor in Inequality Studies

The minor in inequality studies allows undergraduate students to supplement their studies for their major with a coherent program of courses oriented toward the study of inequality. The minor is organized into tracks examining such topics as globalization and inequality; social policy; the ethics of inequality; poverty and economic development; social movements; education and inequality; race and ethnicity in comparative perspective; and the family and inequality. The minor is open to students enrolled in any of the seven Cornell undergraduate colleges. When the

requirements of the minor are met, an official note is made on the student's academic record (see www.inequality.cornell.edu/academics for further information).

Symposia and Lecture Series

CSI regularly sponsors symposia, workshops, and lecture series that draw attention to the most pressing problems and controversies in the field. The current schedule of events is listed on the center's web site (www.inequality.cornell.edu).

For more information about CSI, contact us at 254-8674 or inequality@cornell.edu.

COGNITIVE SCIENCE

278G Uris Hall
255-6431
cogst@cornell.edu
www.cogsci.cornell.edu

Cognitive Science focuses on the nature and representation of knowledge. It approaches the study of perception, action, language, and thinking from several perspectives—theory, experiment, and computation—with the aim of gaining a better understanding of human cognition and the nature of intelligent systems. The comparison between human and artificial intelligence is an important theme, as is the nature of mental representations and their acquisition and use. Cognitive Science draws primarily from the disciplines of computer science, linguistics, neuroscience, philosophy, and psychology. The field of Cognitive Science is primarily represented by faculty members in the following departments: Communication, Computer Science, Design and Environmental Analysis, Economics, Education, Electrical and Computer Engineering, Human Development, Information Science, Linguistics, Mathematics, Mechanical and Aerospace Engineering, Neurobiology and Behavior, Philosophy, Psychology, and Sociology, as well as the Johnson Graduate School of Management.

Undergraduate Programs

An undergraduate minor in Cognitive Science in the College of Arts and Sciences provides a framework for the design of structured, individualized programs of study in this growing interdisciplinary field. Such programs of study are intended to serve as complements to intensive course work in a single discipline as represented in an individual department. For further information on the undergraduate program, see the Cognitive Science Program under College of Arts and Sciences and/or contact Julie Simmons-Lynch, program coordinator (255-6431 or cogst@cornell.edu).

Graduate Programs

Cornell offers a graduate field minor in Cognitive Science. Cornell's unique program of graduate training, which seeks to tailor an optimal program of study and research for each individual, fosters interdisciplinary committees. It is the norm for students interested in Cognitive Science to combine faculty members from such fields as philosophy, computer science, linguistics, psychology, or neurobiology and behavior on common committees. For further information on the graduate field of Cognitive Science, contact Morten Christiansen, director of graduate studies (255-3570, mhc27@cornell.edu).

edu) and/or contact Julie Simmons-Lynch, program coordinator, 278G Uris Hall, Office of Cognitive Science (255-6431 or cogst@cornell.edu).

Courses

Courses from across the university that are relevant to the Cognitive Science Program are listed in this catalog in the Cognitive Science Program section under Arts and Sciences.

CORNELL ABROAD

300 Caldwell Hall
255-6224 (tel.)
255-8700 (fax)
cuabroad@cornell.edu
www.cuabroad.cornell.edu

Study abroad is an integral part of a Cornell education. Those aspiring to lead in this century need, more than ever before, knowledge and experience of the diverse world beyond the boundaries of their home country. To help students develop the knowledge, skills, and attitudes necessary for informed citizenship in today's world, Cornell Abroad offers a wide range of international study opportunities that reflect the fundamental educational goals and objectives of the university. Study abroad is a continuous experience with study on campus, enabling students to make regular progress toward the degree.

Qualified students study abroad through programs administered by Cornell and other institutions, and by enrolling directly in foreign universities. Among the many study abroad programs available, students select programs with thoughtful planning and apply with the approval of their colleges and faculty advisors. To earn credit for overseas study during the fall and/or spring semester(s), students must apply through Cornell Abroad, whose staff members assist in the planning and application process.

LOCATIONS ABROAD

Cornell students majoring in a broad array of fields in all seven undergraduate colleges study in more than 40 countries each year. The following list includes programs chosen frequently by students with college approval; programs preceded by an asterisk (*) are managed by or affiliated with Cornell.

AFRICA

Botswana, Cameroon, Ghana, Kenya, Madagascar, Mali, South Africa, Tanzania, Uganda: SIT Study Abroad

Ghana: University of Ghana (through CIEE); NYU

Kenya: Wildlife Management (School for Field Studies); University of Nairobi; Minnesota Studies in International Development

South Africa: Universities of Cape Town and KwaZulu-Natal, Organization for Tropical Studies, International Human Rights Exchange (Bard)

ASIA

China: Chinese University of Hong Kong; *Cornell FALCON at Peking University; Inter-University Program for Chinese Language Studies at Tsinghua University, Beijing; Peking, Nanjing, and East China Normal Universities (CIEE); International Chinese Language Program at National Taiwan University; IES, CET, and the Alliance for Global Education in Beijing or Shanghai; Hong Kong University of Science and Technology; Syracuse or Columbia University program at Tsinghua University; *CAPS at Peking University

India: School for International Training; St. Stephen's College Delhi (through Brown or Rutgers University); CIEE at University of Hyderabad; IES Delhi; Alliance for Global Education in Pune

Indonesia: SIT Study Abroad, Bali

Japan: *Kyoto Consortium for Japanese Studies; International Christian University and other university programs; IES Tokyo; CIEE Tokyo at Sophia University; Kyushu University

Korea: Yonsei University; Ewha University

Nepal: *Cornell-Nepal Study Program (Samyukta Adhyayan Karikam Nepal) at Tribhuvan University

Thailand: Khon Kaen University (CIEE)

Vietnam: University of Hanoi (CIEE), CET

AUSTRALIA AND NEW ZEALAND

Australia: Australian National University, Canberra; University of Sydney; University of Melbourne; University of New South Wales, Sydney; University of Queensland, Brisbane; University of Western Australia, Perth; School for Field Studies Tropical Rainforest Studies; Sydney Internship (Arcadia, Boston University)

New Zealand: Otago, Auckland, Massey, Canterbury, and Lincoln Universities; EcoQuest

EUROPE

Czech Republic: UPCES (CERGE-EI) at Charles University, CET program in Jewish Studies, CIEE Prague

Denmark: *Danish Institute for Study Abroad (DIS)

France: *EDUCO (Cornell, Duke, and Emory in Paris) at Université de Paris VII, Paris IV, Paris I, Institut d'Études Politiques de Paris ("Sciences Po"); Critical Studies Program at the University of Paris (CIEE); Paris Internship (Boston University); IES Business and International Affairs, Paris

Germany: *Berlin Consortium for German Studies at the Free University of Berlin; Wayne State University in Munich and Freiburg; Heidelberg University

Greece: College Year in Athens; Arcadia

Hungary: Central European University; CIEE Budapest; Budapest Semester in Math

Ireland: Trinity College Dublin and the National University Colleges of Dublin, Galway, and Cork

Italy: *Bologna Consortial Studies Program; *Cornell College of Architecture, Art, and Planning in Rome; Arcadia University in Florence at the Accademia Italiana; Boston University in Padova; IES Milan and Rome; Intercollegiate Center for Classical Studies in Rome or Sicily; Syracuse University in Florence

Netherlands: University of Amsterdam; Leiden University

Russia: St. Petersburg University (CIEE); Moscow International University and other universities (American Council of Teachers of Russian); Smolny College, Math in Moscow

Spain: *Cornell-Michigan-Penn program at the University of Seville; *Consortium for Advanced Studies in Barcelona; various language and culture programs

Sweden: The Swedish Program at the University of Stockholm

United Kingdom: *Direct enrollment at: the University of Birmingham; University of Bristol; Cambridge University; City University; University of East Anglia; University of Edinburgh; University of Glasgow; University of Manchester; University of Oxford; University of St. Andrews; University of Sussex; University of Warwick; University of York; University of London: King's College, University College (including the School of Slavonic and East European Studies), Imperial College of Science and Technology, the London School of Economics and Political Science, and the School of Oriental and African Studies, the University of the Arts (including London College of Fashion), as well as other universities and art schools of choice.

Externally sponsored programs in the UK include the British American Drama Academy; the Arcadia, Boston, and Rochester University internships; and the Hansard Parliamentary Internship Programme.

Students studying in the United Kingdom enjoy a variety of services, and cultural activities, provided by the Cornell-Brown-Penn Centre in London.

LATIN AMERICA, CENTRAL AMERICA, AND THE CARIBBEAN

Argentina, Chile, or Peru: various university-based study abroad programs, through the Institute for Study Abroad of Butler University or CIEE

Brazil, Chile, Ecuador, Mexico, Nicaragua, Panama, Peru: School for International Training (SIT)

Costa Rica: Organization for Tropical Studies (OTS) Semester Abroad in tropical biology; School for Field Studies; CIEE

Ecuador: Minnesota Studies in International Development

Ecuador, Jamaica, or Mexico: International Partnership for Service Learning (IPSL)

Honduras: Escuela Agrícola Panamericana (Zamorano)

Mexico: Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM); Universidad de las Americas-Puebla (UDLA); Universidad Iberoamericana; School for Field Studies in Baja California; ISFA-Butler program at Universidad Autónoma de Yucatán, Merida

MIDDLE EAST AND NORTH AFRICA

Egypt: American University in Cairo

Israel: Ben-Gurion University; University of Haifa; Hebrew University of Jerusalem; Tel Aviv University

Jordan: University of Jordan (CIEE), SIT

Lebanon: American University of Beirut

Morocco: SIT Study Abroad, CIEE, Boston University, IES

Oman: SIT Study Abroad

Other Locations

Cornell students are by no means limited to the locations listed above or to the programs identified for particular countries. In recent years, they have also studied in Austria, Croatia, Dominican Republic, Finland, Mongolia, Poland, Portugal, Switzerland, Tajikistan, Turkey, Venezuela, and elsewhere.

Who Studies Abroad

Students from all seven undergraduate colleges and from all major fields study abroad; they are expected to have a cumulative grade point average of 3.0 or above. Over 500 undergraduates studied abroad last year. Because the colleges usually require that students complete at least 60 hours of undergraduate credit on the Ithaca campus, students who transfer to Cornell as juniors may be unable to count study abroad credit toward their Cornell degree.

When Students Study Abroad and for How Long

Students may study abroad during their sophomore, junior, or senior year. Junior year is the traditional choice, but second-semester sophomore year or first-semester senior year abroad is increasingly popular. To ensure preparation, it is important to begin planning for study abroad as early as freshman year. Although semester-long programs are usually available, academic-year programs are highly recommended.

Application Process

Applications for all study abroad programs—Cornell programs, as well as those administered by other institutions—are available at Cornell Abroad, 300 Caldwell Hall, where students are encouraged to consult the library of study abroad materials, talk with staff members, and attend information meetings. The Cornell Abroad web site is an excellent resource for links to universities and programs worldwide, as well as for applications and comprehensive information on all aspects of study abroad. Students meet with the study abroad advisors in their colleges to discuss how they will meet college degree requirements.

Each applicant completes a written statement of academic purpose outlining goals for study abroad and the program of study that will be followed. College Approval Forms are signed by both the faculty advisor and the college study abroad advisor. Arts and Sciences,

Human Ecology, and Industrial and Labor Relations students submit applications to their college for forwarding to Cornell Abroad; Agriculture and Life Sciences, Architecture, Art, and Planning, Engineering, and Hotel Administration students submit applications directly to Cornell Abroad. Cornell Abroad reviews all applications and forwards them to programs and universities. *All students who wish to receive academic credit for study abroad must apply through Cornell Abroad and their undergraduate college.*

The application *deadline* for study abroad in the fall 2010 semester and the 2010–2011 academic year is February 15, 2010, for all programs *except* Oxford and Cambridge, for which the deadline to study at those universities for the academic year in 2010–2011 is November 1, 2009. Many universities and programs admit on a rolling basis before and after these dates. Students planning to study abroad in the spring semester should initiate the application process during the preceding spring. Early application may improve your chances of admission. In all cases, it is a good idea to check with Cornell Abroad.

Registration, Credit Transfer, and Grades

Students who apply through Cornell Abroad to programs approved by their colleges, as outlined above, remain registered at Cornell during study abroad. They are eligible for financial aid and receive full academic credit for pre-approved courses of study completed with satisfactory grades. Students enroll for a normal full load of courses abroad, according to the standards of the institution or program overseas, and usually receive 30 credits per year, or 12 to 20 credits per semester. The colleges review course work taken abroad and make the final decisions concerning credit transfer and distribution. When study abroad credit has been transferred, the Cornell transcript will indicate the names of the courses taken, the grades received, and the total credits earned for each semester. *Foreign grades are not translated into the Cornell/American grading system, nor are they averaged into the Cornell grade point average.*

Foreign Language Requirements

Study abroad programs in non-English-speaking countries that offer direct enrollment in universities generally require the equivalent of at least two years of college-level language study. Students should make firm plans for any requisite language courses early in their freshman year. English-language study abroad programs are increasingly available in non-English-speaking countries—for example, Belgium, Denmark, Egypt, France, Hong Kong, Hungary, Israel, Italy, Japan, Korea, Netherlands, People's Republic of China, and Sweden. Cornell requires students who participate in programs in a non-English-speaking country with English-language course work to take at least one language course as part of their program of study and strongly encourages them to take more. Students should consult with their college study abroad advisors about relevant language preparation, and students in the College of Arts and Sciences should note that they are required to have studied the host country language, if taught at Cornell, before study abroad.

Housing Arrangements

Study abroad programs generally provide housing in the homes of local residents, in halls of residence for university students, or in rental apartments. Cornell Abroad will advise students of the arrangements that are available and most appropriate to their individual needs.

Costs

Students studying abroad in Cornell-managed programs pay a fixed Cornell Abroad Tuition per semester, which covers tuition, housing during term (with some exceptions), orientation, program-sponsored trips and events, and administrative and financial aid costs, including emergency medical evacuation and repatriation coverage. It may include other items (e.g., meals, commuter passes) depending on the program. Students pay other costs (e.g., airfare and personal expenses) directly. Different fee levels for Cornell programs reflect the relative costs of operation.

Pending approval by the Board of Trustees, in 2009–2010 the Cornell Abroad Tuition for students participating in the Berlin Consortium for German Studies, the Cornell Nepal Study Program, EDUCO (Emory, Duke, and Cornell in Paris), or the Michigan–Cornell–Penn Program in Seville is \$21,950.

For the Denmark Institute for Study Abroad (DIS), the Cornell Abroad Tuition is \$23,490 per semester, and for the Kyoto Consortium for Japanese Studies (KCJS), the Tuition is \$28,325 per semester. For the Bologna Consortial Studies Program (BCSP), the Tuition is \$16,345 per semester for academic-year students and \$18,995 for spring-only participants. For the Consortium for Advanced Studies in Barcelona (CASB) the fee is \$22,250 for fall and \$23,600 for spring.

Students studying in all other programs in 2009–2010 pay the tuition and other costs charged by their programs and a Cornell International Program Tuition (CIPT) of \$4,995 per semester. The CIPT covers the direct and indirect costs of study abroad to the university, including financial aid for all study abroad students. Students studying in the United Kingdom and Israel on direct enrollment programs at British and Israeli universities pay a Cornell International Program Tuition of \$5,410. This higher amount covers the cost of on-site support services provided by Cornell Abroad.

Financial Aid

Students who are accepted for study abroad during the academic year or semester, having applied through Cornell Abroad, are eligible for two semesters of financial aid, consistent with general university aid policy; this applies to all programs, whether run directly by Cornell or not. Students who have transferred into Cornell with 60 or more credit hours are not likely to receive aid for study abroad assuming they would thereby need more than eight semesters to earn the undergraduate degree. Some programs abroad offer need-based and merit-based scholarships; there are also external sources of aid for which Cornell Abroad students are eligible.

Security Abroad and Related Issues

The decision to study in a particular region of the world must be made by each student and his or her family in light of their own interpretation of current events. The director, associate director, and staff of Cornell Abroad stay in regular contact with representatives abroad and receive information regarding safety and security conditions worldwide through the U.S. Department of State Office of Citizens Emergency Services and other agencies. As long as the State Department does not restrict travel by U.S. citizens, Cornell Abroad does not normally recommend limitations on student plans for study abroad. Cornell Abroad will do everything possible to notify students immediately that they should defer plans when official travel restrictions are issued. Nothing is as important as student security and well-being.

Responsibility for a decision to withdraw from a program or return home early rests with the individual and his or her family. There can be no guarantee of credit for students who withdraw from programs sponsored by colleges and universities other than Cornell; they are advised to inquire about the policies of those institutions regarding the completion of academic work and the potential financial implications of premature departure. In the event of a disrupted semester, refunds of tuition and fees, and the number of credits to be awarded, will be reviewed by Cornell and affiliated institutions on a case-by-case basis. Most institutions sponsoring study abroad programs strive to facilitate student completion of academic programs even under unusual circumstances and have tuition refund policies based on prorated formulas.

Sources of Information and Advice Concerning Study Abroad

Cornell Abroad (300 Caldwell Hall): Richard Gaulton, Ph.D., director; Kristen Grace, Ph.D., associate director; Libby Okihiro, student services coordinator; Kathy Lynch, financial services coordinator. The Cornell Abroad library contains an extensive collection of university catalogs and study abroad program brochures, files of course syllabi and evaluations, books, videotapes and CDs, and some information on travel, summer study, and work abroad. Comprehensive information is provided on the Cornell Abroad web site (www.cuabroad.cornell.edu), which incorporates links to universities, programs, and resources worldwide as well as a database of cost estimates. In the early weeks of every semester, students and faculty and staff members discuss programs in a series of information meetings announced in the *Cornell Daily Sun* and on the Cornell Abroad web site (www.cuabroad.cornell.edu). The director and associate director are available at Cornell Abroad for individual advising.

College Study Abroad Advisors

Agriculture and Life Sciences: Christine Potter, 140 Roberts Hall; *Architecture, Art, and Planning:* Melanie Holland, B-1 West Sibley Hall; *Arts and Sciences:* Dean Pat Wasyliv, 55 Goldwin Smith Hall; *Engineering:* Engineering Advising, 167 Olin Hall; *Hotel Administration:* Barbara Lang, 180 Statler Hall; *Human Ecology:* Paul Fisher, 172 Martha Van Rensselaer Hall; *Industrial and Labor Relations:* Kevin Harris, 101 Ives Hall.

CORNELL IN WASHINGTON PROGRAM

M101 McGraw Hall
255-4090
ciw.cornell.edu

Cornell in Washington is a unique opportunity for students in any major or with any career interest. Qualified juniors and seniors in all colleges can earn full academic credit—and grades that count in their GPAs—for a semester in Washington, D.C., taking small, seminar courses from Cornell faculty members, conducting research, getting real-life work experience, and living at the Cornell Center near Dupont Circle.

Washington, as the center of much of the nation's political energy, is an ideal place to be part of American public policy and the institutions and processes through which it is formulated and implemented. At the same time, Washington's rich collection of libraries, museums, theaters and art galleries offers an opportunity to enjoy and explore American cultural life, present and past. Washington's vast financial, technology, and health-related sectors create endless opportunities in those arenas, as well.

In addition to working at a self-selected externship, Cornell in Washington students enroll in one of two core courses—Studies in Public Policy or Studies in the American Experience—that involve a major research project on a topic of their choice. Students also select one or two other seminars from such fields as government, history, economics, history of art, and social policy. All seminars carry appropriate credit toward fulfillment of major, distribution, and other academic requirements.

The program is housed at the Cornell Center, 2148 O Street, NW, Washington, DC 20037. The academic and administrative space is located on the first floor and 27 residential units for approximately 60 students are on the upper floors.

Tuition

Students are registered as full-time students, earn Cornell credit, pay full tuition of their home college, and remain eligible for financial aid.

Housing

Apartments are rented at the Cornell Center. All are fully furnished (except for dishes, cookware, towels, and bedding) and reasonably priced by both Washington and Cornell standards. Two students are assigned to each efficiency and three to each one-bedroom apartment. Students are discouraged from bringing automobiles. The public transportation system, consisting of both bus and subway service, is extensive and convenient to the center, and street parking is not permissible.

Applications

Students may apply online at ciw.cornell.edu or obtain an application from the Cornell in Washington program office at M101 McGraw Hall. Applications should be submitted the semester before participation.

Summer in Washington

A modified program involving courses and internships is available during the summer. Students earn 6 to 8 credits depending on their course selection.

Information

The Cornell in Washington program web site is located at ciw.cornell.edu. Regular information meetings are held on campus in early October and March. These meetings are advertised in the *Cornell Daily Sun* and on campus bulletin boards. Additional information concerning externships, courses, housing, and other features of the program may be obtained at either the Cornell in Washington program office at M101 McGraw Hall, 607-255-4090, or in Washington at the Cornell Center, 2148 O Street, NW, Washington, DC 20037, 202-466-2184.

CORNELL INSTITUTE FOR PUBLIC AFFAIRS

294 Caldwell Hall
255-8018 (tel.)
255-5240 (fax)
cipa@cornell.edu
www.cipa.cornell.edu

The Cornell Institute for Public Affairs (CIPA) offers a university-wide two-year program of graduate professional studies leading to the master of public administration (M.P.A.) degree. CIPA leverages the vast academic and professional resources of Cornell to train the next generation of leaders working at the intersections of the public, private, and nonprofit sectors.

CIPA fellows (graduate students) have the opportunity to study public policy and program management from a cross-disciplinary perspective. Students gain an understanding of the political and administrative processes through which issues, problems, and policies are formulated; the economic and fiscal basis for government action in a market economy; and the analytical tools for assessing policy implications. They study the behavior of both public and private organizations and their management. They also develop sensitivity to the moral and ethical dimensions of policy issues.

Faculty Members

The depth and flexibility of the program is reflected in the growing number of affiliated faculty members. CIPA is not confined within a single school or college, but spans the entire university. More than 100 field faculty members, representing 25 departments, welcome CIPA fellows into their courses and serve on professional report/thesis committees. The core faculty is the heart of the CIPA structure. With broad representation from across the university, the core faculty bring an academic richness to CIPA that transcends disciplinary boundaries. These faculty members provide instruction in the foundation courses. Core faculty members include David B. Lewis, CIPA director, City and Regional Planning; Richard Booth, City and Regional Planning; Nancy Brooks, City and Regional Planning; Nancy Chau, Applied Economics and Management; Gary S. Fields, the John P. Windmuller Chair in International and Comparative Labor; Neema Kudva, City and Regional Planning; (Daniel) Pete Loucks, Civil and Environmental Engineering; Theodore J. Lowi, the John L. Senior Professor of American Institutions in the Department of Government; Kathryn S. March, Anthropology; Norman Uphoff, Government; and Jerome Ziegler,

Department of Policy Analysis and Management.

M.P.A. Program Flexibility

The two-year master of public administration (M.P.A.) degree program consists of 16 courses; CIPA fellows typically take four courses per semester for four semesters. Although the M.P.A. program offers a basic structure for study, each CIPA fellow works closely with a faculty advisor to design an individualized program based on his or her specific area of interest. Courses may be taken through the program in any department or college in the university.

Advising

Upon entering the M.P.A. program, each fellow is assigned a program advisor based on his or her area of interest. These advisors are drawn from the CIPA core faculty. They assist fellows in designing their individual program of study and selecting their courses. The assignment of advisors is meant to assist new students in getting a strong start with their studies. Once familiar with the resources available, students are welcome to ask another core faculty member to be their program advisor.

Toward the end of their first year, when they select their professional report/thesis topic, CIPA fellows choose a report/thesis advisor from among the more than 100 faculty members in the field of public affairs. The advisor guides the fellow in research and writing.

Foundation Course Work

To develop a foundation of basic concepts and capabilities for the study of public policy, CIPA fellows take three courses in each of the following three subject areas:

- Administration, Politics, and Public Policy
- Economics and Public Finance
- Quantitative Analysis

At least one of the three courses in each subject area must be a core foundation course—a course taught by a CIPA core faculty member.

Concentration Course Work

Concentration course work enables fellows to focus on a specific area of public policy study. Students choose their course of study—domestic or international—from the following options:

- Environmental Policy
- Finance and Fiscal Policy
- Government, Politics, and Policy Studies
- Human Rights and Social Justice
- International Development Studies
- Public and Nonprofit Management
- Science and Technology Policy
- Social Policy

Fellows select a concentration during the latter half of the first year of course work.

Practical Experience, Internships, Off-Campus Study, and/or Public Service Exchange

Experiential learning is an integral component of CIPA's educational strategy, and a practical experience such as an internship is a

requirement for obtaining the M.P.A. degree. Internships allow students to apply training in a practical environment and establish contacts for permanent employment. CIPA's Office of Professional Development provides assistance to fellows in finding internships that match their interests, expertise, and professional goals. Appropriate internships are available in public policy— or public affairs—related organizations in both the public and private sector. In recent years, 98 percent of fellows actively searching for an internship find one. Organizations include:

- Deloitte and Touche
- Government Accountability Office
- New York City Office of Management and Budget
- The Overseas Private Investment Corporation
- United Nations
- U.S. Agency for International Development
- U.S. Congress
- U.S. Congressional Research Service
- U.S. Department of State
- World Food Program
- state, local, and urban municipal governments
- nongovernmental organizations and think tanks worldwide
- private sector consulting firms

CIPA fellows also have the opportunity to gain professional experience off-campus, while taking a semester of courses for credit, through the following three programs:

- Cornell in Rome
- Cornell in Washington
- Cornell–Nepal Study Program

In 2008, two additional opportunities for study abroad became available in Mexico City, Mexico, and Budapest, Hungary.

Fellows may also fulfill the practical experience requirement by participating in the Public Service Exchange, a unique service learning partnership with nonprofit and government agencies, providing fellows with the opportunity to engage in the supervised practice of public policy. For more information, see www.pse.cipa.cornell.edu.

Professional Writing Requirement

As a culmination of studies in the M.P.A. program, each fellow develops and submits either a professional report or thesis. Typically, the report or thesis grows out of a fellow's specific area of concentration and often incorporates work done during the summer internship or an off-campus study program. Both the CIPA professional report and the thesis require the student to synthesize and apply his or her education to formulate a solution to a policy problem. The thesis places a greater emphasis on problem definition and literature review, while the professional report emphasizes feasibility, practitioner accessibility, and adapting a student's writing to the professional culture and standard practices of the client organization. The level of work expected for the M.P.A. thesis or professional report is equivalent to one or two semester-long courses.

Co-Curricular Activities

CIPA fellows gain practical skills by organizing, managing, and participating in a variety of professional development activities on campus. These provide fellows with opportunities to share work experience with other fellows, and to meet practitioners and distinguished faculty members in the field of public affairs. These student-led initiatives include:

- **Colloquium Committee:** This student group sets the agenda for the weekly Colloquium Series and makes arrangements for the chosen guest lecturers to come to campus.
- **Point of View (POV):** The CIPA Public Affairs television program, POV is part talk show and part debate show. Fellows work in all aspects of TV production and presentation, gaining invaluable experience for the media exposure they will encounter as public-policy professionals.
- **The Current:** CIPA fellows publish a journal of student policy research. Working on *The Current* offers fellows a firsthand view of the rigors of publishing academic work, and also provides a foundation in professional writing and editing—necessary skills for preparing reports and position papers, and publishing research findings.

Complementary Degrees

CIPA fellows may elect to combine their M.P.A. program with study for a complementary degree such as a J.D. from the Cornell Law School, an M.B.A. from the Graduate School of Management, an M.M.H. from the Hotel School, or an M.R.P. in the field of City and Regional Planning. Admission to the complementary degree program is independent from admission into CIPA.

Accelerated Master's Program

An accelerated program for Cornell undergraduates allows advanced students to apply to CIPA in their junior year, begin CIPA-related course work in their senior year, and complete the M.P.A. in just one year beyond their undergraduate studies.

Residence Requirement

Fellows are required to spend four semesters of study in residence to complete the M.P.A. Those who enroll in the Cornell Accelerated Master's Program can earn the equivalent of two semesters in residence during their senior year.

Admission

The CIPA program seeks diversity in its student body, drawing from a pool of applicants who have studied in a wide range of disciplines. No specific background or undergraduate major is required, although individuals with previous work experience in policy making or implementation are strongly encouraged to apply. Admission to CIPA is selective. A faculty committee evaluates individual applications based on the following:

- overall academic record
- potential for public-policy leadership as evidenced by professional work; community, extracurricular, or other relevant experience (a copy of one's current résumé is an application requirement)

- GRE scores
- two letters of recommendation
- an extensive written statement of purpose, as outlined on the CIPA web site: www.cipa.cornell.edu

Applicants for whom English is a second language will need to achieve the following minimum scores on the new (2005) Internet-based test version of the TOEFL: writing 20, listening 15, reading 20, speaking 22.

Although CIPA has a policy of rolling admission, applications should be submitted by the end of January to be considered for financial aid. For more information, contact the Cornell Institute for Public Affairs, 294 Caldwell Hall (tel: 255-8018; fax: 255-5240; cipa@cornell.edu; www.cipa.cornell.edu).

Financial Aid

CIPA provides some funding to more than 80 percent of its students. The institute itself, however, is unable to provide full support for any individual student. Fellows often win support from Fulbright, Truman, World Bank, and other programs. In addition, Cornell offers numerous assistantship and employment opportunities for graduate students. Applicants are encouraged to explore all available sources of external funding, including grants that may be provided by current employers. Decisions on institute funding are determined on a rolling basis following admission decisions.

CORNELL PLANTATIONS

One Plantations Road
255-2400
plantations@cornell.edu
www.plantations.cornell.edu

Introduction

Cornell Plantations is Cornell University's arboretum, botanic garden, natural areas, and many on-campus gardens—places of exceptional beauty, diversity, and learning opportunities. Areas managed include over 4,000 acres of natural areas on and off campus in addition to the 150 acres in the F. R. Newman Arboretum and the 25 acres of botanical gardens in and around central campus.

Cornell Plantations provides unique outdoor laboratories and plant collections for Cornell's academic programs and research in disciplines such as ecology and evolutionary biology, landscape architecture, ornamental horticulture, and bioengineering. While many of Cornell Plantations' resources are on or near campus, several thousand acres in and around Tompkins County preserve quality examples of native vegetation and rare plants and animals. The lands include bogs, fens, glens, swamps, wet and dry forests, vernal ponds, and meadows. Arrangements to use these natural areas for classes and research can be made by calling Cornell Plantations. Cornell Plantations has something for everyone! We're also the many places that non-horticultural students and faculty members visit for classes ranging from art, literature, and women's issues, to nutrition.

Credit Courses

Cornell Plantations offers two for-credit courses: HORT 4800 Plantations Fall Lecture Series and HORT 4850 Public Garden

Management. HORT 4800 is a 1-credit S-U lecture series offered each fall. HORT 4850 is a 3-credit course offered alternate spring semesters. Cornell Plantations also offers noncredit classes and workshops such as botanical illustration, arts and crafts, gardening techniques, and ecology walks; visit www.plantations.cornell.edu, or call 255-2400 for more information.

Internships

Cornell Plantations' internship program is just for you, the Cornell University student! Since the 1990s, more than 100 university students have been working side by side with Plantations' knowledgeable staff, learning and having fun. A number of positions in various areas are available each year, beginning after finals in May. All positions strive to build on classroom learning through hands-on work, encouraging students' interests in horticulture and the natural world. Visit our web site for details.

Master's Program

Cornell Plantations' master of professional studies program offers fully funded fellowships in public garden leadership. Visit our web site for program details.

Planning a Visit

To discover all that is Cornell Plantations, visit www.plantations.cornell.edu or pick up a visitor's map or a copy of the *Cornell Plantations Path Guide* at the Garden Gift Shop in the Lewis Education Center just below Tower Road. The *Path Guide* and accompanying video are also available at the Cornell Store.

PROGRAM ON ETHICS AND PUBLIC LIFE

240 Goldwin Smith Hall
255-8515

The critical issues of public life are inescapably ethical issues. In the economy, we face questions of equity and justice and questions about the relation between prosperity, the environment, and the quality of individual lives. In constitutional law, we confront dilemmas about civil rights, freedom of speech, privacy, and abortion. In politics and government, we wrestle with questions about campaigning, character, and compromise. And in international affairs, we encounter the complexities of war and peace, human rights, multilateral aid, and climate change.

The university-wide Program on Ethics and Public Life (EPL) is Cornell's initiative in the systematic study of the ethical dimension of specific public issues. EPL grew out of a conviction that these questions need something more than abstract philosophical discussion. In addition to the general study of values and principles that goes on in theoretical ethics, universities need to foster ways of thinking about the complex, uncertain, and urgent problems of the real world, ways of thinking that are realistic without sacrificing their ethical character.

EPL seeks to enhance and facilitate the discussion of ethical issues by students whose central educational interests lie elsewhere, but whose work and lives will nevertheless

confront them with dilemmas and responsibilities for which a university education should prepare them. EPL aims to enrich existing departments with courses that are intellectually and practically fruitful at the same time. It offers a minor in Law and Society (see separate listing under "Special Programs and Interdisciplinary Studies").

For information about the Program on Ethics and Public Life, visit the program's web site, www.arts.cornell.edu/epl.

PROGRAM IN REAL ESTATE

114 West Sibley Hall
255-7110

The two-year master of professional studies in real estate (M.P.S./RE) degree program is an interdisciplinary program that combines courses from nearly every college at Cornell University. The degree is designed for aspiring real estate professionals who are in the initial or early stages of their careers. The Program in Real Estate at Cornell University is home to the graduate program in real estate as well as the Cornell Real Estate Council, which is the centerpoint of academic and industry-related real estate activities on and off campus. The real estate field faculty is composed of 23 faculty members selected from several different colleges that are directly involved in and responsible for the design, delivery, and administration of the real estate curriculum.

The professional study of real estate is concerned with the design, development, finance, law, management, marketing, transactions, deal structuring, and many other aspects of the real estate business. Real estate professionals also contribute an understanding of the long-range social, political, ethical, and environmental implications of decisions about real estate. The 62 credit hours of course work needed to earn the degree provide a comprehensive and lasting foundation for professional careers in real estate.

Students take core courses in principles of real estate, the real estate development process, real estate finance and investments, communication in real estate, managerial finance, residential development, real estate law, construction planning and operations, design in real estate development, transactions and deal restructuring, and real estate marketing and management, along with a weekly industry seminar. Elective courses are taken in a chosen area of concentration and to fulfill a leadership and management distribution requirement. Many concentration options are possible and may be structured from the hundreds of related courses taught at Cornell University. Areas of concentration include development, finance, investments, real estate consulting, sustainable development, property and asset management, real estate marketing and market analysis, international real estate concentrations, and others. Students complete real-world, semester-long project workshops during their second and fourth semesters.

Admissions

Applicants to the Program in Real Estate must have completed a bachelor's degree with a good academic record. Applicants must submit a résumé plus two letters of recommendation either from faculty members familiar with the

applicant's academic work or, if appropriate, professional recommendations based on work experience. Competitive scores for the GMAT are required. Extensive and relevant work experience will receive favorable consideration. International students for whom English is a second language will need to achieve a minimum TOEFL score set by the Cornell Graduate School. There is no work experience required for admission; however, it is strongly preferred that applicants have at least some industry-related work experience, with three to five years' experience typical. Applications are reviewed on a rolling basis. The financial aid priority and dual-degree applicant deadline is January 15, and the regular application deadline is March 15; otherwise, applications will be accepted until June 1. For more information, contact the admissions coordinator at 255-7110 or real_estate@cornell.edu.

SCIENCE OF EARTH SYSTEMS: AN INTERCOLLEGE MAJOR

During the past several decades, with the increasing concern about air and water pollution, nuclear waste disposal, the ozone hole, sufficient natural resources to meet the needs of a rapidly growing world population, and global climate change, the scientific community has gained considerable insight into how the biosphere, hydrosphere, atmosphere, and lithosphere systems interact. Our society is challenged to identify the best path for achieving a sustainable balance between human actions and the natural Earth system. To meet this challenge and to withstand the fundamental process of the Earth system, modern Earth sciences probe the interconnections of the biosphere, hydrosphere, atmosphere, and lithosphere.

The Science of Earth Systems (SES) major emphasizes the rigorous and objective study of the Earth system as one of the outstanding intellectual challenges of modern science and as the necessary foundation for the future management of our home planet. In this program, Cornell's strengths across a broad range of earth and environmental sciences have been coalesced to provide students with the tools to engage in what will be the primary challenge of the 21st century.

Graduates of Cornell's SES program are well prepared for several career and advanced study options:

- Graduate studies leading to the M.S. and/or Ph.D. in any of the earth science sub-disciplines (e.g., atmospheric science, geological sciences/geophysics, biogeochemistry, hydrology, oceanography).
- Employment in environmentally oriented careers in both the private and public sector at the B.S. or B.A. level such as environmental consulting and science writing.
- Employment in natural resources industry, including fossil fuels and water. These fields usually require an M.S. degree.
- Graduate degree in environmental law or policy. These fields value students with an understanding of the science behind legal and policy decisions.

- Advanced degree in teaching, for example, earth science at the middle or high school level.
- Medical school. The emphasis on basic sciences in the SES curriculum makes the SES major a suitable springboard for a career in medicine.

The SES major is available for students in the College of Agriculture and Life Sciences, the College of Engineering, and the College of Arts and Sciences. The SES major has its home in the Department of Earth and Atmospheric Sciences and includes collaboration with several departments across the university.

The SES Curriculum

The SES curriculum provides strong preparation in mathematics, physics, chemistry, and biology during the freshman and sophomore years. In the junior and senior years, students take a set of common SES core courses and an additional set of advanced disciplinary or interdisciplinary courses that build on the basic sequences.

The requirements for the major are as follows:

1. Basic Math and Sciences
 - a. MATH 1110–1120, or MATH 1910–1920
 - b. PHYS 2207–2208, or PHYS 1112–2213
 - c. CHEM 2070–2080 or CHEM 2090–2080 (or 2070–1570)
 - d. one year of biology: BIOG 1101/1103 and 1102/1104 (or 1105–1106) or BIOG 1109 and 1110, or BIOEE/EAS 1540, or EAS 1700
2. Required introductory course: EAS 2200 The Earth System
3. Science of Earth Systems Core Courses

The core courses emphasize the interconnectedness of the Earth system. These courses are founded on the most modern views of the planet as an interactive and ever-changing system, and each crosses the traditional boundaries of disciplinary science. Three courses selected from the following four core courses are required for the major:

 - EAS 3010 Evolution of the Earth System
 - EAS 3030/NTRES 3030 Introduction to Biogeochemistry
 - EAS 3040 Interior of the Earth
 - EAS 3050 Climate Dynamics

4. Concentration Courses

Four intermediate to advanced-level courses (3000 level and up) are selected that build on the core courses and have prerequisites among the "Basic Math and Sciences" courses listed above. Note that additional basic math and science courses may be required as prerequisites for courses chosen for the concentration. These concentration courses build depth and provide the student with specific expertise in some facet of earth system science. Four concentrations are defined for the major: atmospheric sciences, biogeochemistry, geological sciences, and ocean sciences (see EAS web site for details). Other concentrations can be tailored to a student's interests in concert with the student's advisor and upon approval of the SES curriculum committee. Examples include sustainable Earth and environmental systems, earth system science and policy, hydrology, planetary science, and soil science.

5. Field/observational/laboratory experience

Exposure to the basic observations of earth science, whether directly outdoors in the field, or indirectly by various techniques of remote sensing, or in the laboratory, is necessary to understand fully the chosen area of concentration in the major. A minimum of 3 credits of course work of an observational nature is required. Possibilities include:

Courses given in the Hawaii Environmental Semester program;

Courses given by the Shoals Marine Laboratory;

EAS 2500 Meteorological Observations and Instruments;

EAS 3520 Synoptic Meteorology I;

EAS 4170 Field Mapping in Argentina;

EAS 4370 Geophysical Field Methods;

EAS 4910 and/or 4920 Undergraduate Research, total 3 credits with appropriate choice of project;

Field courses taught by another college or university (3-credit minimum)

Cornell Field Program in Earth and Environmental Systems: Semester in Hawaii

Cornell University offers a spring-semester program of environmental and Earth systems study on the Big Island of Hawaii. The Hawaiian Islands are an outstanding natural laboratory where students can explore a variety of ecosystems, examine their development over time, witness human influences on plant and animal communities, and experience geologic processes such as active volcanism and seismicity. Students spend most of their time in the field, gaining hands-on experience probing the interaction between earth, ocean, atmosphere, and biosphere. This is an ideal opportunity to apply fundamental concepts of geology, chemistry, and biology in a real-world setting. Students enrolled in the Environmental Semester Program will complete 19 credit hours of course work during the spring semester. For Cornell students majoring in Science of Earth Systems, EAS 3220, EAS 3400, and EAS 3510 satisfy degree requirements for the major.

For more information contact Professor John Cisne, Department of Earth and Atmospheric Science, john.cisne@cornell.edu, and visit www.eas.cornell.edu.

Business and Preprofessional Study

UNDERGRADUATE BUSINESS STUDY

Cornell offers a highly ranked accredited general undergraduate business degree program as well as world-renowned business-related programs in five other colleges and schools. Because the choices are so broad, students are encouraged to explore the offerings carefully to identify the program that best matches their business career goals. (Graduate study is available in the Johnson Graduate School of Management as well as in

graduate fields associated with each of the undergraduate options.)

Applied Economics and Management The Department of Applied Economics and Management (AEM) in the College of Agriculture and Life Sciences is home to Cornell's only undergraduate degree that is accredited by AACSB International—The Association to Advance Collegiate Schools of Business. AEM's undergraduate program offers a broad, flexible curriculum that reflects the department's analytical, applied economics approach. Students choose among 10 specializations: finance, marketing, strategy, accounting, entrepreneurship, agribusiness management, food industry management, environmental and resource economics, international trade and development, and applied economics (aem.cornell.edu).

Arts and Sciences Many of the liberal arts majors offered by the College of Arts and Sciences provide students with a background for a successful business career. In particular are majors in economics, mathematics, sociology, and psychology. Economics focuses on the production, distribution, and consumption of goods and services; monetary systems; and economic theories. Students interested in the human dimensions of business can choose sociology or psychology. Mathematics majors can choose concentrations in computer science, operations research, statistics, or economics to prepare for careers in areas such as actuarial science or finance (www.arts.cornell.edu).

Engineering Many of today's business managers hold engineering degrees. Each of the College of Engineering's 13 majors prepares students for business careers. Operations Research and Engineering and Information Science, Systems and Technology are the most business-oriented engineering degree programs, preparing graduates for careers in areas such as investment banking and process engineering. Engineering students in any major can take a business-oriented minor in areas such as industrial systems and information technology, and operations research and management science. A new business minor for engineering students is also offered by the Department of Applied Economics and Management (www.engineering.cornell.edu).

Hotel Administration The School of Hotel Administration offers the world's premier hospitality management program. Its rigorous core business curriculum includes courses in finance and accounting; real estate development; facilities management, planning, and design; food and beverage management; marketing, tourism, and strategy; information systems; operations; managerial and organizational behavior; human resource management; managerial communication; and law. The school's 153-room conference hotel gives students the opportunity to apply what they learn in a real-world business and its Practice Credit requirement further ensures a balance between classroom learning and real-world practice (www.hotelschool.cornell.edu).

Human Ecology The College of Human Ecology offers three business-oriented majors. The fiber science and apparel design major prepares students for careers in the fashion industry, for example, as a retail executive or merchandise buyer. Students majoring in design and environmental analysis can choose the facility planning and management option to prepare for careers as facility planners and

workplace strategists in consulting and real estate firms and large corporations. The policy analysis and management major offers concentrations focusing on health, consumer policy, and family and social welfare, and its graduates pursue careers as policy makers, analysts, and managers in both the public and private sectors (www.human.cornell.edu).

Industrial and Labor Relations The School of Industrial and Labor Relations (ILR) focuses on the "people" side of business. Its professional-level curriculum provides a strong social science foundation in organizational behavior; human resource studies; collective bargaining, labor law, and labor history; labor economics; international and comparative labor; and social statistics. Most ILR graduates begin careers in management, consulting, and public policy; four out of 10 graduates go on to law school or other graduate programs (www.ilr.cornell.edu).

Related Areas

Entrepreneurship@Cornell This university-wide program is open to all Cornell students interested in eventually starting their own businesses or working for venture capital firms. Entrepreneurship-related courses are offered by all seven of Cornell's undergraduate colleges and schools as well as by the Johnson Graduate School of Management, the Law School, and the College of Veterinary Medicine (eship.cornell.edu).

International Programs Several additional programs allow business students to focus on a particular geographic area. Majors and concentrations are offered in Latino Studies, French Studies, German Studies, China and Asia-Pacific Studies, Asian Studies, Near Eastern Studies, and Africana Studies (all in the College of Arts and Sciences). The College of Agriculture and Life Sciences offers an interdepartmental program in international agriculture and rural development.

PRELAW STUDY

Law schools do not prescribe any particular prelaw program, nor do they require any specific undergraduate courses as do medical schools. Law touches nearly every phase of human activity, and there is practically no subject that cannot be considered of value to the lawyer. Therefore, no undergraduate course of study is totally inappropriate. Students contemplating legal careers should be guided by certain principles, however, when selecting college courses.

1. Interest encourages scholarship, and students will derive the greatest benefit from those studies that stimulate their interest.
2. Of first importance to the lawyer is the ability to express thoughts clearly and cogently in both speech and writing. First-year writing seminars, required of nearly all Cornell first-year students, are designed to develop these skills. English literature and composition, and communication courses, also serve this purpose. Logic and mathematics develop exactness of thought. Also of value are economics, history, government, and sociology, because of their close relation to law and their influence on its development and ethics, and philosophy, because of the influence of philosophic reasoning on legal reasoning

and jurisprudence. Psychology and human development lead to an understanding of human nature and mental behavior. Some knowledge of the principles of accounting and of the sciences such as chemistry, physics, biology, and engineering is recommended and will prove of practical value to the lawyer in general practice in the modern world.

3. Cultural subjects, though they may have no direct bearing on law or a legal career, will expand students' interests; help cultivate a wider appreciation of literature, art, and music; and make better-educated and well-rounded persons.
4. Certain subjects are especially useful in specialized legal careers. For some, a broad scientific background—for example, in agriculture, chemistry, physics, or engineering—when coupled with training in law, may furnish qualifications necessary for specialized work with the government, for counseling certain types of businesses, or for a career as a patent lawyer. A business background may be helpful for those planning to specialize in corporate or tax practice. Students who anticipate practice involving labor law and legislation might consider undergraduate study in the School of Industrial and Labor Relations. Whatever course of study is chosen, the important goals are to acquire perspective, social awareness, and a critical cast of mind; to develop the ability to think logically and analytically; and to express thoughts clearly and forcefully. These are the crucial tools for a sound legal education and a successful career.

The presence of the Cornell Law School on campus provides the opportunity for a limited number of highly qualified undergraduates registered in the College of Arts and Sciences at the university to apply and be admitted to the Law School. At the time of entry they must have completed 105 of the 120 credits required for the bachelor of arts degree, including 92 credits of course work in the College of Arts and Sciences.

It may be possible for exceptionally well-qualified students in other Cornell undergraduate colleges to apply to enter the Law School after three years. In addition, members of the Cornell Law School faculty sometimes offer undergraduate courses such as *The Nature, Functions, and Limits of Law*, which are open to all undergraduates.

PREMEDICAL STUDY

Medical and dental schools, while not requiring or recommending any particular major course of study, do require that particular undergraduate courses be completed. These courses usually include general chemistry and organic chemistry, biology, and physics, and all must be taken with a lab. A year of English composition (or a first-year writing seminar) is also required. In addition, many medical schools require or recommend mathematics and at least one advanced biological science course, such as biochemistry, genetics, embryology, histology, or physiology.

There is no major that is the best for those considering medical or dental school, and students are therefore encouraged to pursue their own intellectual interests. Students are more likely to succeed at, and benefit from,

subjects that interest and stimulate them, and there is no evidence that medical colleges give special consideration to any particular undergraduate training beyond completion of the required courses. In the past, successful Cornell applicants to medical and dental schools have come from the Colleges of Arts and Sciences, Agriculture and Life Sciences, Human Ecology, and Engineering. The appropriate choice depends to a great extent on the student's other interests.

PREVETERINARY STUDY

There is no specific preveterinary program at Cornell, and students interested in veterinary medicine as a career should select a major for study that fits their interests while at the same time meeting the entrance requirements for veterinary college as listed below. Most preveterinary students at Cornell are enrolled in the College of Agriculture and Life Sciences, which offers several applied science majors, including animal science, that can lead to related careers if the student does not go to veterinary college. Some enter other divisions of the university, especially the College of Arts and Sciences, because of secondary interests or the desire for a broad liberal arts curriculum.

The college-level prerequisite courses for admission to the College of Veterinary Medicine at Cornell are English composition, biology or zoology, physics, inorganic chemistry, organic chemistry, biochemistry, and microbiology. All science courses must include a laboratory. These requirements, necessary for admission to the College of Veterinary Medicine at Cornell, may vary at other veterinary colleges.

For information on additional preparation, including work experience and necessary examinations, students should consult the brochure, Admissions Information, obtained by writing to the Office of D.V.M. Admissions, College of Veterinary Medicine, Cornell University, S2-009 Schurman Hall, Ithaca, NY 14853-6401. Information on the Guaranteed Admissions Program is available from the same address.

Qualified students in the College of Agriculture and Life Sciences may apply for acceptance in a double-registration program arranged between Cornell University and the College of Veterinary Medicine at Cornell. This program allows registered students to save one year in pursuit of the bachelor's and D.V.M. degrees. Further information about this program is available from the Office of Multicultural and Diversity Programs, College of Agriculture and Life Sciences, 140 Roberts Hall, Ithaca, NY 14853.

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

INTRODUCTION

College Focus

The College of Agriculture and Life Sciences offers men and women broad-based educational programs to provide them with technical, management, and leadership skills in four primary areas of focus. These areas were developed in response to the global challenges of the 21st century. They are fluid, overlapping, and interdependent and represent agriculture and life sciences at its broadest and most dynamic meaning. These four areas are:

- Land-grant, or agricultural sciences
- Applied social sciences
- Environmental sciences
- New life sciences

Faculty members challenge students with educational programs that promote problem-solving, basic and applied research, extension, and outreach. The programs are geared to the discovery and dissemination of knowledge for the purpose of advancing agriculture and food systems, health and nutrition, food security, biological sciences, education, communication, natural resources and environmental quality, and community, urban, and rural development throughout New York State, the nation, and the world.

Administration

Susan A. Henry, dean

Barbara A. Knuth, senior associate dean

Jan P. Nyrop, senior associate dean

Margaret H. Ferguson, associate dean for finance and administrative services

Michael P. Riley, associate dean for alumni affairs, development, and communications

Donald R. Viands, associate dean and director of academic programs

Mark W. Wysocki, associate director of academic programs

Jeffrey J. Doyle, director of undergraduate biology

Michael P. Hoffmann, associate dean and director of the Cornell University Agricultural Experiment Station

Helene R. Dillard, associate dean and director of cooperative extension

Christopher B. Watkins, associate director of cooperative extension

Glenn J. Applebee, associate director of cooperative extension

W. Ronnie Coffman, director of international programs

James E. Haldeman, senior associate director of international programs

Terry W. Tucker, associate director of international programs

Alice Pell, director of Cornell International Institute for Food, Agriculture, and Development

Department Chairs

Animal science: W. Ronald Butler, 149 Morrison Hall

Applied economics and management: Loren W. Tauer, 154 Warren Hall

Biological and environmental engineering: Daniel J. Aneshansley, 104 Riley-Robb Hall; Beth A. Ahner, associate chair, 202 Riley-Robb Hall

Biological statistics and computational biology: James Booth, 1178 Comstock Hall

Communication: Geri K. Gay, 339 Kennedy Hall

Crop and soil sciences: Harold van Es, 235 Emerson Hall

Development sociology: Max Pfeffer, 133A Warren Hall

Earth and atmospheric sciences: Larry D. Brown, 3120 Snee Hall; Arthur T. DeGaetano, associate chair, 1119 Bradfield Hall

Ecology and evolutionary biology: Nelson G. Hairston, Jr., E345 Corson Hall

Education: Arthur L. Wilson, 435 Kennedy Hall

Entomology: Jeffrey G. Scott, 2130 Comstock Hall

Food science: Kathryn J. Boor, 114 Stocking Hall

Horticulture: Marvin P. Pritts, 134A Plant Science Bldg.

Landscape architecture: Peter J. Trowbridge, 443 Kennedy Hall

Microbiology: William C. Ghiorse, B76C Wing Hall

Molecular biology and genetics: Kenneth J. Kempthues, 107A Biotechnology Bldg.

Natural resources: Marianne E. Krasny, 118 Fernow Hall

Neurobiology and behavior: Kraig Adler, W363A S. G. Mudd Hall

Plant biology: William L. Crepet, 412 Mann Library

Plant breeding and genetics: Mark E. Sorrells, 241 Emerson Hall

Plant pathology and plant-microbe biology: George W. Hudler, 334 Plant Science Bldg.

Statistical sciences: Martin T. Wells, 1190 Comstock Hall

Student Services

Office of Academic Programs

The College of Agriculture and Life Sciences (CALS) provides a variety of services for students, faculty, and alumni. The hub of these services is the Office of Academic Programs in Roberts Hall, including the

director, associate director, the Admissions Office, the Career Development Office, the Counseling and Advising Office, the Multicultural and Diversity Office, and the Registrar's Office. Although most of the student services are in the Office of Academic Programs, services also are located across the college in the Office of Undergraduate Biology and in various departments. Faculty members in the College of Agriculture and Life Sciences consider advising to be an important and integral part of the undergraduate program. Each student enrolled in the college is assigned to a faculty advisor in his or her major field of study for assistance and guidance in developing a program of study and to enhance the student's academic experience.

The Counseling and Advising Office coordinates the faculty advising program, serves as the college's central undergraduate advising office, coordinates the college international exchange programs, and offers consultation and support for personal issues. Two counselors with expertise in college policies and guidelines provide confidential consultation and support appropriate to each student's academic circumstances. Students seek advising, consultation, and support on a variety of issues including academic problems, course problems and college procedures, graduation requirements, personal and family problems, stress management, and time management.

Academic advising is available for students who are interested in international study, need to file petitions, wish to waive college academic regulations, have disability concerns, are experiencing academic difficulties, take or return from leave of absence, or have requests for tutoring.

The staff coordinates new student orientation, award ceremonies, commencement activities, and the activities of Ho-Nun-De-Kah, the college's honor society.

The staff is available on a walk-in basis as well as by appointment in 140 Roberts Hall. Visit www.cals.cornell.edu/advising. Counseling and Advising staff: Lisa Ryan, Bonnie Shelley, Pamela Torelli, and Christine Potter.

The Office of Multicultural and Diversity Programs serves to monitor, support, and influence policy on behalf of all underrepresented students within the College of Agriculture and Life Sciences. This population is defined as encompassing, but not limited to, all African American, Latin American, Asian American, and Native American students. Its constituency includes students, faculty, and the general public. In the past academic year this represented approximately 20 percent of the college's undergraduate population. Additionally, the office is charged with monitoring and programming for the Educational Opportunity Program (EOP). EOP is a state-supported program intended to assist New York State students who meet economic and academic criteria set by the college, State Programs

Office, and New York State Board of Regents. For further information, please contact Catherine Thompson in 140 Roberts Hall.

Within the university, the Office of Multicultural and Diversity Programs is charged with acting as the college liaison with the central Office of Minority Education Affairs, Learning Strategies Center, and the State Programs Office. Other university connections include the University Career Center and the Office of Financial Aid regarding concerns of the underrepresented student population. The director provides support for the CALS Diversity Committee. The director together with peer advisors carries out the duties of the office. The staff acts as a major advocacy group as well as an information and referral center.

Given the college's policy on nonexclusionary programming, the Office of Multicultural and Diversity Programs is also responsible for some functions that serve the college's entire population. At present, that includes general college diversity activities, serving as the college prehealth advisor, and providing ongoing support at all levels for the Office of Counseling and Advising.

The CALS Registrar's Office ensures the accuracy, confidentiality, and reliability of student records and serves as an important link between the university's and college's policies, procedures, and the student. The Registrar's Office maintains student records and reviews degree progress on a semester basis, maintains the Dean's List, evaluates and applies non-Cornell credit (transfer credit, study abroad credit, and advanced placement credit), provides registration and enrollment information, consults individually with students on college graduation requirements, and schedules all CALS courses. Specific information can be found at www.cals.cornell.edu/current/registrar.

The CALS Registrar's Office holds walk-in hours to assist students with any registrar-related issue. Walk-in hours are Tuesdays from 9:00 to 11:00 A.M. and Wednesdays from 2:00 to 4:00 P.M. in 140 Roberts Hall. No appointment is necessary during these times. Registrar's Office staff: Torrey Jacobs, Shawna Lockwood, and Adrienne Wilson.

The Office of Career Development offers a variety of helpful services to all students and alumni of the college. Career development includes self-assessment, career exploration, decision making, and transition to employment or further study. Services are designed to assist students and alumni with those activities and to help them develop the career planning and job search skills they will find useful as their career paths progress and change.

The Career Library contains an extensive collection of current and useful material, including web sites, career information books, extensive internship files, employer directories, and job listings. Alumni Career Link is a database of more than 500 college alumni who have offered to help students and alumni with their career development in a variety of ways. Job search talks on topics such as résumé writing, cover letter writing, and interview skills are presented throughout the semester and are available on DVD. An active on-campus recruiting program brings more than 50 employers to campus each year to interview students for full-time and

summer jobs. Additionally, the office provides information on hundreds of internships.

The office, in conjunction with a network of college faculty and staff members, assists students throughout their undergraduate years and beyond. For further information, students should contact Amy Benedict-Augustine, Laurie Gillespie, Jennifer DeRosa, Jo-Lynn Buchanan, or Derek Trulson in 177 Roberts Hall.

The CALS Admissions Office is responsible for admitting and enrolling a talented and diverse class of students each year. The process and outcome must reflect and support the college mission and help to meet college and institutional enrollment goals. This includes freshman, transfer, and intra-university transfer student processes. The office hosts on- and off-campus information sessions for prospective students, evaluates and makes decisions on more than 5,000 applications each year, and coordinates events for admitted students. The Admissions Office staff advises and supports the CALS Ambassador program. The office is located in 177 Roberts Hall. Staff members include Ann LaFave, Cathy Sheils, Tara Bubble, Jared Rivers, Jeri Nyrop, Erica Walters, Victoria Watts, and Victoria Parker.

Students

Undergraduate enrollment is approximately 3,200, with about 57 percent in the upper division. Each year about 850 students graduate, while 648 freshmen and 275 new transfer students enroll. College faculty members serve as chairs of the Special Committees of roughly 1,000 graduate students.

Admission

A significant factor taken into consideration by the CALS admissions committee is how well a student's academic interests relate to the mission of the college. If you decide to apply for admission to the College of Agriculture and Life Sciences, we'll ask you to choose from more than 20 major fields of study. As a part of the application process, you'll be asked to write about your academic interests and to articulate how you see your interests blending into our programs that contribute to the mission of the college. Majors fall within these broad areas: life sciences, environment, social sciences, and agriculture and food. Appropriateness for the college must also align with high academic achievement. While approximately 60 percent of CALS students come from New York State, about 40 percent come from other parts of the United States or abroad. Slightly more than half of the undergraduates are women. Approximately 26 percent are self-identified as members of ethnic groups.

The CALS Admissions Office is in 177 Roberts Hall (255-2036; www.cals.cornell.edu/admissions; e-mail: als_admissions@cornell.edu).

Transfer Students

All accepted transfer credit must be from an accredited college or university. Transfer credit is awarded based on review of official transcripts. Additional course information may be required. Contact the CALS Registrar's Office for information. A maximum of 60 non-Cornell credits may be transferred.

Approximately 30 percent of CALS undergraduate students are transfers who have completed part of their collegiate work at community colleges, two- and four-year institutions. Detailed information on transfer admission is available on the CALS Admissions web site.

Intra-University Transfer

A Cornell student in good standing may apply for an intra-university transfer to pursue an academic program unavailable in his or her current college. Guidelines are available on the CALS Admissions web site. The procedure involves attending an information session, meeting with a faculty member in the proposed area of study, and submitting an application and essay.

Consideration is given to students who have demonstrated an interest in their proposed new field of study by taking appropriate prerequisite courses. Academic achievement is also considered. Students need to spend two semesters in their home college before applying. In certain cases, a student may be referred to the Internal Transfer Division (ITD) to study for one semester before entering the college. During this trial semester, the student must achieve a predetermined grade point average and take approved courses to assure acceptance.

Special Students

A limited number of nondegree candidates who want to take courses in the college are admitted each year. Applicants should complete the Cornell transfer application process. For more information and guidelines, students should contact the CALS Admissions Office.

Off-Campus Students

Programs in which students study off campus but enroll for Cornell credit include SEA semester, Semester in Environmental Science with the Marine Biology Laboratory, field study in Human Ecology or Industrial and Labor Relations, Capital Semester, Cornell in Washington, and IPM internship.

Facilities

The College of Agriculture and Life Sciences is located on the upper campus on land that was once part of the Ezra Cornell family farm.

Buildings around the area commonly known as the Ag Quad house classrooms, offices, and laboratories. Flanking them are the greenhouses, gardens, and research facilities. Nearby orchards, barns, field plots, forests, and streams extend as far as the Animal Science Teaching Research Center at Harford and the New York State Agricultural Experiment Station at Geneva.

Roberts Hall serves as headquarters for the administrative units, including offices of the deans and directors of academic programs, Cornell University Agricultural Experiment Station, and Cornell Cooperative Extension. Included in the Office of Academic Programs are the director and associate director, the Admissions Office, the Career Development Office, the Counseling and Advising Office, the Office of Multicultural and Diversity Programs, and the Registrar's Office.

Mann Library, with its extensive collections of materials in the agricultural and life sciences,

is at the east end of the Ag Quad. The student lounge and service center, known as the Alfalfa Room, and many of the college classrooms are in Warren Hall. Public computer facilities are available in Mann Library.

DEGREE PROGRAMS

The College of Agriculture and Life Sciences offers programs leading to the degrees bachelor of science, master of science, and doctor of philosophy. Professional degrees include the master of professional studies, master of landscape architecture, and master of arts in teaching. Some registered professional licensing and certification programs are also available.

Each curriculum in the college creditable toward a degree is registered with the New York State Education Department.

Bachelor of Science Degree

Departments in the College of Agriculture and Life Sciences sponsor study for the B.S. degree in 24 major programs. To qualify for the degree, students must fulfill requirements established by the faculty of the college and administered through the Office of Academic Programs. Students are admitted into a single major but afterwards may pursue and graduate with two or more majors within the College of Agriculture and Life Sciences. Students need an advisor in each major. Course requirements for double majors may overlap. The Counseling and Advising Office (140 Roberts Hall) and department representatives have a form for students to complete to officially recognize the double major. The following units offer major fields of study for undergraduates. A faculty advising coordinator is listed for each unit. Students should consult with the faculty coordinator regarding requirements and opportunities for concentrations in the major.

Majors

Agricultural sciences: Antonio DiTommaso, 903 Bradfield Hall, ad97@cornell.edu

Agricultural science education: William Camp, 416 Kennedy Hall, wgc4@cornell.edu

Animal science: W. Bruce Currie, 434 Morrison Hall, wbc1@cornell.edu

Applied economics and management: Dale Grossman, 114 Warren Hall, dag14@cornell.edu

Atmospheric science: Mark Wysocki, 1114 Bradfield Hall, mww3@cornell.edu

Biological engineering: Michael Walter, 207 Riley-Robb Hall, mfw2@cornell.edu

Biological sciences: Jeffrey Doyle, 404 Mann Library, jid5@cornell.edu; Bonnie Comella, 216 Stimson Hall, bec3@cornell.edu

Biology and society: Brian Chabot, 102 Little Rice, bfc1@cornell.edu

Biometry and statistics: Steven Schwager, 1194 Comstock Hall, sjs5@cornell.edu

Communication: Danielle Dean, 334 Kennedy Hall, dyd1@cornell.edu

Crop and soil sciences: Antonio DiTommaso, 903 Bradfield Hall, ad97@cornell.edu

Development sociology: Tom Hirschl, 333 Warren Hall, tah4@cornell.edu

Entomology: John Losey, 4126 Comstock Hall, jel27@cornell.edu

Environmental engineering: Michael Walter, 207 Riley-Robb Hall, mfw2@cornell.edu

Food science: Alicia Orta-Ramirez, 107 Stocking Hall, ao98@cornell.edu

Information science: Christine Stenglein, 303 Upson Hall, cms242@cornell.edu

Interdisciplinary studies: Lisa Ryan, 140 Roberts Hall, lar4@cornell.edu

International agriculture and rural development: Terry Tucker, 16 Warren Hall, twt2@cornell.edu

Landscape architecture: Peter Trowbridge, 443 Kennedy Hall, pjt4@cornell.edu

Natural resources: Tim Fahey, 12 Fernow Hall, tfj5@cornell.edu

Nutritional sciences: Charles McCormick, 223 Savage Hall, ccm3@cornell.edu

Plant sciences (crop science; horticulture; plant biology; plant breeding and genetics; plant pathology/protection): Peter Davies, 255 Plant Sciences Bldg., pjd2@cornell.edu

Science of earth systems: John Cisne, 2102 Snee Hall, john.cisne@cornell.edu

Science of natural and environmental systems: Tim Fahey, 12 Fernow Hall, tfj5@cornell.edu

Viticulture and enology: Ian Merwin, 118 Plant Sciences Bldg., im13@cornell.edu

Minors

Students in the College of Agriculture and Life Sciences may pursue one or more minor fields of study in any department in any college that offers them, subject to limitations placed by the department offering the minor or by the student's major. Minor fields of study do not require an academic advisor, but each minor field has a contact person who will provide information and verify on the application to graduate that the student will successfully complete the requirements of the minor by graduation. Students may complete as many minors as they wish; the requirements of minors may overlap. Minors are described along with the majors later in the CALS section of this catalog. Not all majors or departments offer minors. Minors available in CALS can be found on the CALS counseling and advising web site (cals.cornell.edu/cals/current/advising/options/doubmaj.cfm). For minors outside of CALS, please consult with the specific department.

Early Enrollment in Cornell Graduate Programs

The College of Veterinary Medicine may accept students who are then permitted to double-register in their seventh and/or eighth semester and complete requirements for the bachelor of science degree in the College of Agriculture and Life Sciences. Students should consult with the college registrar, 140 Roberts Hall, to file an application for dual-enrollment and to ensure that degree requirements have been fulfilled.

Students who have been offered admission to the S. C. Johnson Graduate School of Management may take management courses in their senior year if approved by their college faculty advisor as part of their undergraduate program. Students

may consult with the college registrar, 140 Roberts Hall, to verify degree requirements and endowed credits earned.

The Department of Landscape

Architecture offers a first professional degree curriculum in landscape architecture at both undergraduate (BSLA) and graduate levels (MLA I) as well as a second professional graduate degree program (MLA II). The curricula for both the undergraduate and graduate programs are accredited by the Landscape Architecture Accreditation Board (LAAB). The graduate program is cosponsored by the Department of Landscape Architecture in the College of Agriculture and Life Sciences and by the College of Architecture, Art, and Planning.

Graduate Fields of Study

Graduate study is organized by fields that generally coincide with the academic departments but may draw faculty from several disciplines in the various colleges of the university. The following graduate fields have primary affiliation in Agriculture and Life Sciences. Current directors of graduate studies are also listed. For more information on graduate programs, please refer to the Graduate Bulletin, or www.gradschool.cornell.edu. Information following this list refers to undergraduate studies.

Agriculture and life sciences [M.P.S. (agr.)]: Don Viands, 151 Roberts Hall, drv3@cornell.edu

Agricultural economics: David Just, 254 Warren Hall, drj3@cornell.edu

Animal breeding: John Pollak, B-47 Morrison Hall, ejp6@cornell.edu

Animal science: Richard Quaas, B-47 Morrison Hall, rlq1@cornell.edu

Atmospheric sciences: Daniel Wilks, 1113 Bradfield Hall, dsw5@cornell.edu

Biochemistry, molecular, and cell biology: Volker Vogt, 358 Biotechnology Bldg., vmv1@cornell.edu

Biological and environmental engineering: Antje Baeumner, 306 Riley-Robb Hall, ajb23@cornell.edu

Biometry: Robert Strawderman, 1172 Comstock Hall, rls54@cornell.edu

Biophysics: Gerald W. Feigenson, 201 Biotechnology Bldg., gwf3@cornell.edu

Communication: Jeff Hancock, 320 Kennedy Hall, jth34@cornell.edu

Development sociology: acting DGS, Charles Geisler, 237 Warren Hall, ccg2@cornell.edu

Ecology and evolutionary biology: Monica Geber, E413 Corson Hall, mag9@cornell.edu

Education [also M.A.T.]: John Sipple, 421 Kennedy Hall, jws28@cornell.edu

Entomology: Cole Gilbert, 6136 Comstock Hall, cg23@cornell.edu

Environmental toxicology: Andrew Yen, Stocking Hall, ay13@cornell.edu

Food science and technology: Martin Wiedmann, 412 Stocking Hall, mw16@cornell.edu

Genetics and development: Bik Tye, 325 Biotechnology Bldg., bt16@cornell.edu

Horticulture: Nina Bassuk, 33 Plant Science Bldg., nlb2@cornell.edu

International agriculture and rural development [M.P.S. (agr.)]: Steven Kyle, 249 Warren Hall, sck5@cornell.edu

International development: Norman Uphoff, 33A Warren Hall, ntu1@cornell.edu

Landscape architecture [M.L.A.]: Dan Krall, 440 Kennedy Hall, dwk5@cornell.edu

M.P.S. agriculture with Peace Corps option (offered by most agriculture fields with M.P.S. programs): Jim Haldeman, 36 Warren Hall, or see director of graduate studies for chosen field, jeh5@cornell.edu

Microbiology: James Shapleigh, 257A Wing Hall, jps2@cornell.edu

Natural resources: Clifford Kraft, 206H Fernow Hall, cek7@cornell.edu

Neurobiology and behavior: Joseph Fetcho, W103 Mudd Hall, jrf49@cornell.edu

Nutritional sciences: Charles McCormick, 223 Savage Hall, ccm3@cornell.edu

Physiology: Robin Davison, T9-014C Vet Research Tower, rld44@cornell.edu

Plant biology: Klaas van Wijk, 332 Emerson Hall, kv35@cornell.edu

Plant breeding: Walter DeJong, 309 Bradfield Hall, wsd2@cornell.edu

Plant pathology: Michael Milgroom, 357 Plant Science Bldg., mgm5@cornell.edu

Plant protection [M.P.S. (agr.)]: William Reissig, Barton Laboratory, Geneva Campus, whr1@cornell.edu

Soil and crop sciences: Dan Buckley, 705 Bradfield Hall, dhh28@cornell.edu

Statistics: Robert Strawderman, 1172 Comstock Hall, rls54@cornell.edu

Zoology: Susan Suarez, T5002B Vet Research Tower, sss7@cornell.edu

OPPORTUNITIES IN RESEARCH

Undergraduate Research

A multitude of opportunities to be engaged in research exists across the College of Agriculture and Life Sciences and the university.

Students may be able to work on a faculty member's research project for pay. Opportunities can be explored by contacting individual faculty members; departmental offices; the CALS Career Development Office, in 177 Roberts Hall; or Cornell Career Services, in 103 Barnes Hall. Another option is to receive credit through a 4990-level course within a department by conducting your own research project under a faculty mentor. More than 600 students each year conduct research for credit. Upperclass students usually have the course background to engage in research, but freshmen and sophomores also may be equipped to do some types of research. Off-campus research experiences are also available for pay or as internships.

The following web sites provide information about research and internships:

CALS Career Development Office:
www.cals.cornell.edu/cals/current/career

CALS Undergraduate Research Opportunities:
www.cals.cornell.edu/cals/current/student-research/undergrad (information on how to explore research opportunities)

CALS Research Honors Program:
www.cals.cornell.edu/cals/current/student-research/honors

CALS Undergraduate and Graduate Student Grants Proposal Development:
www.cals.cornell.edu/cals/current/student-research/grants

CALS Undergraduate Minority Research:
www.cals.cornell.edu/cals/current/student-research/minority

CALS Internship Guidelines:
www.cals.cornell.edu/cals/current/student-research/internship

Undergraduate Research @ Cornell:
www.research.cornell.edu/undergrad

Cornell Undergraduate Research Board:
www.research.cornell.edu/curb (student organization to promote and facilitate undergraduate research)

Biological Sciences:
www.biology.cornell.edu

Research Honors Program

The Research Honors Program provides students with a special opportunity to work with a faculty mentor to experience the research process. Successful completion requires a thesis written in the style of a master's thesis or scholarly journal article. Original honors research may be suitable for publication in a professional journal. Students may volunteer to publish their theses in the Internet-First University Press if it does not interfere with other plans, such as patenting or publishing in another journal. During each summer the *CALS Research Honors Abstracts* is published (on the web beginning 2009) as a compilation of honors theses abstracts.

The bachelor of science degree with "distinction in research" is conferred upon those students who, in addition to having completed the requirements for the B.S. degree, have satisfactorily completed the honors program and have been recommended for the degree by the honors committee.

Research may be done in these program areas: animal sciences, biological sciences, biology & society, entomology, information science, landscape studies, natural resources, nutritional sciences, physical sciences, plant sciences, and social sciences. Each program area has its own requirements in addition to the college requirements. After reviewing the requirements of each program area (below), students' questions may be directed toward the appropriate program area chair.

Consult "Undergraduate Research Opportunities" on the web (cals.cornell.edu/cals/current/student-research/undergrad) for information about identifying a research topic, conferring with a faculty member, and undergraduate funding opportunities.

Honors Program Requirements

An undergraduate wishing to enroll in the honors program must have completed at least 55 credits, at least 30 of those 55 at Cornell. In addition, the student must have attained a cumulative Cornell GPA of at least 3.0 (unless otherwise noted by a particular program) at the time of entry.

Interested students must submit a written application and thesis proposal early in the first semester of their senior year; however, they are encouraged to make arrangements with a faculty member during the second semester of their junior year. Several program areas require students to submit their applications and thesis proposal to the program area honors committee chair by the end of the third week, while other program areas have students submit the application and proposal to the CALS Registrar's office by the end of the sixth week. *It is the student's responsibility to know the deadlines and submission procedures for the particular program area of interest.* Application forms are available from the CALS Registrar in 140 Roberts Hall or from the web at www.cals.cornell.edu/cals/current/student-research/honors. Applications for biological sciences students can be picked up at 200 Stimson Hall, and for biology & society students at 306 Rockefeller Hall.

Before the completed application is submitted, signatures of approval are required in the following order: faculty research mentor, academic advisor, and research honors program area chair. After the college registrar verifies the student's GPA, the student will be officially enrolled in the honors program. *Additional requirements for application and completion of the program are described under each program area.*

Academic credit also may be earned by enrolling in an appropriate independent research course (required by some program areas). When applying for admission to the program, the student may, if appropriate, submit a budget and a modest request for research funds (up to \$350). If approved, the funding will be transferred to a departmental account of the student's research advisor to support the student's research. This funding is not to be used as a student salary. Additional funding opportunities are described at cals.cornell.edu/cals/current/student-research/undergrad.

Unless otherwise indicated in the following program area descriptions, the research report in the form of a thesis or journal article should be submitted to the research program committee no later than four weeks before the end of classes of the semester in which the student expects to graduate. Students in the College of Agriculture and Life Sciences wishing to participate in the Research Honors Program are not eligible for distinction in research by participating in a program offered by another college or administrative unit.

The research honors committee for each program area recommends to the college registrar those students who qualify for honors. Only those who maintain a GPA of at least 3.0 will be graduated with "distinction in research."

At or near the completion of their research, students are required to give an oral presentation or poster session during an

appropriate event. Some departments have seminar series when presentations may be given. The Cornell Undergraduate Research Board (CURB) Forum is another venue for presentations.

For more information, go to www.cals.cornell.edu/cals/current/student-research/honors.

The following are the honors program areas:

Animal Sciences

Faculty committee: S. M. Quirk, chair; Y. R. Boisclair, J. R. Giles, J. Gavalchin, P. A. Johnson, T. R. Overton

The objective of the animal sciences research honors program is to provide outstanding undergraduates with the opportunity to pursue supervised independent research and to develop an awareness of the scientific process. It is expected that the research will require significant effort and creative input by the student in its design and execution and in the reporting of the results.

Those students with majors in animal sciences who are interested in doing a research project should consult with their faculty advisors by their junior year. All students are expected to meet the college requirements in qualifying for the program and to complete the following:

- Identify a potential research honors project sponsor (i.e., a faculty member working in the animal sciences) and secure that faculty member's commitment to sponsor the student in the research project. This should be accomplished by the second semester of the junior year. Students are encouraged to implement some research during the junior year and/or summer before the senior year.
- Register for ANSC 4991 Undergraduate Research.
- Participate in ANSC 4020 Seminar in Animal Sciences during the spring semester and report on and discuss the project and results.
- Submit a written thesis to the Animal Sciences Research Honors Committee by the scheduled deadline. Specific information regarding deadlines, format, and organization for the thesis will be provided.
- Meet with the Animal Sciences Research Honors Committee for a short oral defense of the thesis following a review of the thesis by the student's sponsor and the research committee.
- Students may volunteer to submit electronically to the honors committee chair a copy of their final approved thesis (in pdf or Word format) for Mann Library. Mann Library has given CALS the opportunity to have theses available to the public electronically if this does not interfere with other plans, such as patenting or publishing in another journal. A permission form to allow a thesis to be made available online at Mann Library can be obtained from the honors committee chair.
- In addition, students are required to submit electronically to the honors committee chair their thesis title, research advisor's name, and abstract (in Word format). During each summer, the CALS Research Honors Abstracts publication is

published (on the web beginning 2009) as a compilation of research honors thesis abstracts.

Details pertaining to the specific requirements of the program can be obtained from the administrative office of the Department of Animal Science, 149 Morrison Hall.

Biological Sciences

Students interested in the Research Honors Program in the biological sciences should consult with their faculty advisors and with potential faculty research sponsors early in their junior year. See "Independent Research and Honors Program" in the Biological Sciences section of this catalog for complete details. Information on faculty research, applications, and program requirements may be obtained from the Office of Undergraduate Biology, 216 Stimson Hall, or at www.biology.cornell.edu/research/honors.html.

Biology & Society

Faculty committee: B. Chabot, chair

The Research Honors Program in Biology & Society is designed to provide independent research opportunities for academically talented undergraduate students in biology & society. Students who enroll in this program are expected, with faculty guidance, to do independent study and research dealing with issues in biology and society. Students participating in the program should find the experience intellectually stimulating and rewarding whether or not they intend to pursue a research career.

Biology & Society students are considered for entry into the research honors program at the end of the second semester of the junior year. Application forms for the program are available in the Biology & Society office, 306 Rockefeller Hall. To qualify for the Biology & Society Research Honors Program, a student must have an overall Cornell cumulative GPA of at least 3.3, have formulated a research topic, and have found a project supervisor (with a Cornell academic appointment) and a Biology & Society faculty member willing to serve as his or her advisor. The director of undergraduate studies will appoint a third reader of the completed research thesis. Applications will be reviewed by a committee headed by the director of undergraduate studies, who will notify students directly of the outcome. Students will be permitted to register for the research honors program only by permission of the biology & society program. Students must enroll for two semesters for 4 credits each in BSOC, ALS, or HE 4991-4992, Honors Project I and II. More information on the honors program is available in the Biology & Society office, 306 Rockefeller Hall (255-6047).

Important Deadlines

Note: If the following dates fall on a weekend, the deadline is the preceding Friday.

- Last week of second semester of the junior year: Application for honors program submitted to 306 Rockefeller Hall.
- April 11: Thesis completed in a form satisfactory for evaluation and submitted to the three readers.
- April 25: Thesis defense accomplished.

- May 9: Two bound copies of completed and defended thesis submitted to director of undergraduate studies.

Students may volunteer to submit electronically to the honors committee chair a copy of their final approved thesis (in pdf or Word format) for Mann Library. Mann Library has given CALS the opportunity to have theses available to the public electronically if this does not interfere with other plans, such as patenting or publishing in another journal. A permission form to allow the thesis to be made available online at Mann Library can be obtained from the honors committee chair.

In addition, students are required to submit electronically to the honors committee chair their thesis title, research advisor's name, and abstract (in Word format). During each summer, the CALS Research Honors Abstracts publication is published (on the web beginning 2009) as a compilation of research honors thesis abstracts.

Entomology

Faculty committee: C. Gilbert, chair

The Program. A research honors program in entomology may be pursued by any qualified student in the College of Agriculture and Life Sciences. The student need not be majoring in entomology. Insects, because of their variety, small size, and easy availability, are convenient subjects for studying a wide array of problems dealing with living systems. Short life cycles, unique physiologies and developmental patterns, and species with easily managed colony requirements and a wide range of behavioral traits provide the raw material for research honors study. Cornell's diverse faculty interests and extensive collections and library in entomology are also major assets if a student selects entomology as the area for research honors study.

Research honors students have the option of earning academic credit by enrolling in ENTOM 4991 Honors Research in Entomology during any semester while working toward a research honors thesis. Credits and grade option for satisfying requirements of ENTOM 4991 should be discussed with the thesis advisor (following page.)

Note: Enrolling in independent study course, either ENTOM 4970, 4990, or 4991, is not a requirement for graduating with distinction in research honors in entomology.

Sequence of Requirements The Entomology Research Honors Committee requires that an undergraduate who is interested in embarking on a research honors project proceed with the following steps:

1. Discuss the matter with his or her academic advisor, preferably in the junior year. This schedule makes it possible to carefully plan a research project and implement some research during the junior year and/or summer before the senior year.
2. Select an appropriate faculty member in the Department of Entomology who can serve as a supervisor to oversee the honors research. This need not be the student's academic advisor. The academic advisor will be of assistance in determining which faculty entomologist has expertise most compatible with the interests of the student.

3. Prepare a brief, tentative plan for the project for discussion and approval of the honors project supervisor. The plan should include a statement of objectives or hypotheses, proposed methods for testing hypotheses, needs for laboratory space or shared equipment, and a budget outlining financial support needed for travel and supplies.
4. Submit a completed application and proposal approved by the honors project supervisor to the chair of the Entomology Research Honors Committee no later than the end of the fifth week of the first semester of the senior year. Earlier submission is encouraged. Applications are available from the CALS registrar, 140 Roberts Hall. These applications include an opportunity to request a modest amount of funding from the CALS honors program. These funds are distributed only one time per year (in late fall).
5. Submit a brief progress report, approved by the project supervisor, to the Entomology Research Honors Committee by midterm of the semester in which the student will complete his or her graduation requirements.
6. Present a formal seminar reporting the significant findings of the research to the Department of Entomology (as a Jugatae seminar) in the last semester of the senior year.
7. Submit two copies of the final honors thesis (as approved by the thesis supervisor) to the chair of the Entomology Research Honors Committee no later than two weeks before the last day of classes in the semester in which the student anticipates graduation. The thesis will be reviewed by the faculty honors project supervisor and one other referee selected by the chair of the honors committee.
8. Referees will return the thesis to the student one week before the last day of classes. If reviewers indicate that changes must be made, the revised thesis should be submitted to the Entomology Research Honors Committee chair no later than the last day of classes. Referees should include a recommendation to the Entomology Research Honors Committee chair regarding acceptability of the honors thesis. The approved honors theses will be bound and housed in the Entomology Library in Comstock Hall.
9. Students may volunteer to submit electronically to the honors committee chair a copy of their final approved thesis (in pdf or Word format) for Mann Library. Mann Library has given CALS the opportunity to have theses available to the public electronically if this does not interfere with other plans, such as patenting or publishing in another journal. A permission form to allow the thesis to be made available online at Mann Library can be obtained from the honors committee chair.
10. In addition, students are required to submit electronically to the honors committee chair their thesis title, research advisor's name, and abstract (in Word format). During each summer, the CALS Research Honors Abstracts publication is published (on the web beginning 2009)

as a compilation of research honors thesis abstracts.

The complete text of this section can be found at www.entomology.cornell.edu/public/IthacaCampus/EduTraining/Undergrad/EntomHonors.html.

Information Science

Students should follow the CALS social sciences guidelines to obtain research honors in information science.

Landscape Studies

Faculty committee: P. J. Trowbridge, chair

The research honors program in landscape studies offers outstanding undergraduates in CALS the opportunity to work with a member of the landscape architecture faculty to pursue supervised independent research in design, the cultural landscape, landscape archaeology, environmental design, and community-based planning and design. The student need not be a major in the landscape architecture professional design curriculum. The subject matter and nature of the research experience may be quite varied. Students participating should find the experience intellectually stimulating and rewarding, whether or not they intend to pursue a research career. The guidance and supervision of a faculty member with substantial interest and expertise in the subject is essential to the success of the project. It is expected that the research will require significant effort and creative input by the student in its design and execution and in reporting the results.

Students who consider this option should be aware that honors research is undertaken above and beyond any of the requirements for graduation in the major of landscape architecture. It involves a number of deadlines and a considerable time commitment. Before signing on for research honors, students need to consult with their academic advisor to make sure that honors research projects will not interfere with other academic or professional objectives, such as job applications, preparation of portfolios, or application to graduate school. These may need to be deferred until the thesis is complete. Students are responsible for meeting deadlines and being prepared for presentations and other meetings.

Although honors research credits for spring semester junior year and both semesters senior year are designated a letter grade, individual mentors may choose the R grade for work in progress until the project has been fully completed. Grade is determined by each student's mentor. The designation of "distinction in research" on the diploma is awarded at the recommendation of the faculty advisor and other referees to the honors committee chair. An outline of activities for both years is given below.

The Landscape Studies Research Honors Committee requires that an undergraduate who is interested in embarking on a research honors project proceed with the following steps:

1. Junior year: Identify a potential research honors project sponsor and secure that faculty member's commitment to sponsor the student in the research project. This should be accomplished early in the second semester of the junior year and

be finalized by the end of the spring semester. Pre-register during the spring for the research honors program (LA 4991).

2. Work with a faculty advisor to identify and formulate a research problem. If the faculty advisor is not in the Department of Landscape Architecture, select a co-advisor from the department to ensure that the research is consistent with the field.
3. Submit a completed application and proposal (approved by the honors project supervisor and the chair of the research honors committee) no later than the end of the fourth week of the first semester of the senior year. Earlier submissions are encouraged. These will be reviewed by ad hoc committee members, and successful thesis proposals will be submitted to the college honors committee by the sixth week.
4. Carry out an independent research effort that is original and separate from the work of others who may be investigating similar subjects.
5. Submit an outline of the thesis to the chair of the committee by the end of January for a May graduation.
6. Submit a draft to the readers by April 15. Describe and summarize the work within the range of formats used in the master's thesis program or professional journals in design or research. This version will be reviewed by the faculty supervisor and two *ad hoc* reviewers, and the student will be able to incorporate the committee's comments and suggestions into the final version, which will be due the last day of classes. Referees prepare a recommendation to the honors committee chair regarding the acceptability of the honors thesis.
7. Give two oral presentations to the group of other honors research students and invited faculty members. Both presentations are during the student's senior year.
8. Send two bound copies of the completed and defended thesis to the honors committee chair by May 13.
9. Students may volunteer to submit electronically to the honors committee chair a copy of their final approved thesis (in pdf or Word format) for Mann Library. Mann Library has given CALS the opportunity to have theses available to the public electronically if this does not interfere with other plans, such as patenting or publishing in another journal. A permission form to allow the thesis to be made available online at Mann Library can be obtained from the honors committee chair.
10. In addition, students are required to submit electronically to the honors committee chair their thesis title, research advisor's name, and abstract (in Word format). During each summer, the CALS Research Honors Abstracts publication is published (on the web beginning 2009) as a compilation of research honors thesis abstracts.

Natural Resources

Faculty director: J. B. Yavitt, chair

The research honors program in natural resources involves original, independent research that generates novel findings in applied ecology and resource policy and management. Students learn how to design and carry out research under the direct supervision and guidance of a faculty member or senior research associate in the department. Most students in the program begin their research before the start of the senior year, often in the summer after their junior year. Students may enroll and receive credit in independent study (NTRES 4991 Honors Research in Natural Resources) during their honors research. The research findings are presented in a written thesis that is reviewed by two experts in the field. Many theses have been published in leading journals in the disciplinary area of the research. Although the format is not prescribed, the thesis usually consists of a short introduction, relevant materials and methods, a concise presentation of the meaningful data, a discussion, and the student's interpretation of the conclusions. Students also give an oral presentation of their research findings in a special symposium hosted by the department in early May.

Students should adhere to the following schedule.

Junior Year

1. File an informal application with the faculty director. The application includes a project description and advisor information.

Senior Year

1. Register for NTRES 4991 before the add deadline (fall and spring).
2. Sixth week of fall semester: Submit formal application to faculty director (16 Fernow Hall).
3. March 31: Thesis should be close to completion.
4. April 15: Submit two copies of the thesis to the faculty director for *ad hoc* reviews.
5. May 4: Pick up *ad hoc* reviewers' comments from the faculty director.
6. May 15: Submit two copies of the final thesis: one for the college, one for the program director.
7. Week of May 25: Students will be notified of the decision, and the faculty director will recommend that each approved student graduate with "Distinction in Research."
8. Students may volunteer to submit electronically to the honors committee chair a copy of their final approved thesis (in pdf or Word format) for Mann Library. Mann Library has given CALS the opportunity to have theses available to the public electronically if this does not interfere with other plans, such as patenting or publishing in another journal. A permission form to allow the thesis to be made available online at Mann Library can be obtained from the honors committee chair.

9. In addition, students are required to submit electronically to the honors committee chair their thesis title, research advisor's name, and abstract (in Word format). During each summer, the CALS Research Honors Abstracts publication is published (on the web beginning 2009) as a compilation of research honors thesis abstracts.

Nutritional Sciences

Faculty committee: J. T. Brenna

The research honors program in the Division of Nutritional Sciences is a structured experience that requires (1) successful completion of NS 3980, (2) conducting a research project through which the student becomes intellectually engaged in the whole research process, (3) completing a written thesis that reports the research, and (4) giving an oral presentation of the project at the undergraduate honors symposium. Students must maintain a minimum grade point average to graduate with honors in research.

The research honors program is an excellent opportunity for students who are highly interested in research and wish to commit substantial time and intellectual energy to a project that will span about four semesters of their undergraduate experience. Honors students experience the excitement of participating in a project that interests them and reporting the project findings. By working with faculty mentors and other researchers, they develop skills in research methods and data analysis. Students also learn that research projects are labor intensive and that writing research reports, such as the honors thesis, is a vital, but time-consuming, aspect of the research process. This intensive research experience is not suitable for all students, and those who wish a less intensive research experience may conduct research with a faculty member under NS 4010.

Students interested in the program should take NS 3980 as early in their program as possible. Students may review program requirements at the DNS Honors Research Program web site (www.nutrition.cornell.edu/dns7_undergradhonres.html) or contact Professor Brenna. Acceptance into the research honors program occurs when the student (1) is accepted into a faculty member's research program and (2) submits a research proposal abstract that is approved by the director of the research honors program.

Students interested in the program typically spend the spring sophomore semester and fall junior semester exploring honors project opportunities with prospective faculty mentors. Students are responsible for contacting faculty members and applying to their research programs, although some guidance in this process will be provided in NS 3980. By the fall of the junior year, the student is expected to have identified their faculty member and be working with him or her on a proposal abstract, which is due early in the spring junior semester.

Students receive academic credit for work on their honors project under NS 4990. The 6 required credits may be taken over several semesters. How much time is spent on the project each semester will be the decision of the student and the faculty mentor. For each three to four hours of work per week, the faculty mentor usually will assign one hour of

academic credit. This applies to the preparation of the research plan and necessary library research (usually completed during the junior year) as well as the carrying out of the research itself and preparation of the thesis.

The research honors project is the major component of the research honors program. It should be well defined and sufficiently circumscribed to give the student the opportunity to develop the research plan, execute the research, and write an acceptable thesis within the limited time available to students carrying full academic loads. Typically, the project is designed early in the junior year and conducted in the spring junior semester and fall senior semester. Students may arrange with their faculty mentor to work on the project during the summer. The spring senior semester is usually devoted to writing the thesis (at least 25 pages). The student works with the faculty mentor to prepare a draft of the thesis, which is submitted before spring break to a second faculty member for evaluation. When comments are received from the reader, the student must revise the thesis to meet the criteria for acceptance. The student presents the thesis at the Honors Student Symposium at the end of the semester.

Students may volunteer to submit electronically to the honors committee chair a copy of their final approved thesis (in pdf or Word format) for Mann Library. Mann Library has given CALS the opportunity to have theses available to the public electronically if this does not interfere with other plans, such as patenting or publishing in another journal. A permission form to allow the thesis to be made available online at Mann Library can be obtained from the honors committee chair.

In addition, students are required to submit electronically to the honors committee chair their thesis title, research advisor's name, and abstract (in Word format). During each summer, the CALS Research Honors Abstracts publication is published (on the web beginning 2009) as a compilation of research honors thesis abstracts.

Physical Sciences

Faculty committee: S. J. Mulvaney, chair; C. D. Bustamante

The research honors program in physical sciences provides outstanding students with an opportunity to do independent research under the supervision of a faculty member in the Departments of Biological and Environmental Engineering, Food Science, Earth and Atmospheric Sciences, or Biological Statistics and Computational Biology.

In addition to meeting the requirements of the college, the student is expected to:

1. Identify a thesis advisor and thesis topic before the end of the junior year.
2. Work with the thesis advisor to prepare a budget, short research proposal (2-3 pages), and application form. These materials must be received by the Physical Sciences committee chair by the end of the third week of senior year.
3. Enroll in the program for a minimum of two semesters.
4. Enroll in the appropriate departmental undergraduate research course for a total of at least 6 credits.

5. Submit an outline of the thesis to the chair of the committee by the end of January (for a May graduation).
6. Submit a draft of the thesis to the thesis advisor with sufficient lead-time for a revision to be prepared.
7. Submit three copies of the thesis and names of recommended reviewers to the chair of the honors committee by four weeks before the end of classes in the semester in which graduation is expected.
8. Students may volunteer to submit electronically to the honors committee chair a copy of their final approved thesis (in pdf or Word format) for Mann Library. Mann Library has given CALS the opportunity to have theses available to the public electronically if this does not interfere with other plans, such as patenting or publishing in another journal. A permission form to allow the thesis to be made available online at Mann Library can be obtained from the honors committee chair.
9. In addition, students are required to submit electronically to the honors committee chair their thesis title, research advisor's name, and abstract (in Word format). During each summer, the CALS Research Honors Abstracts publication is published (on the web beginning 2009) as a compilation of research honors thesis abstracts.

There is no required format, but the thesis is usually written in the form of a research journal article or a master's thesis.

Further details of the program can be obtained from the chair of the Physical Sciences Research Honors Committee.

Plant Sciences

Faculty committee: R. L. Obendorf, chair; I. A. Merwin, E. B. Nelson, F. S. Rossi, A. DiTommaso, M. E. Smith-Einarson

Students perform independent scientific research under the guidance of faculty members in the fields of horticultural, agronomic, and soil sciences; plant biology; plant genetics and breeding; and plant pathology. For admission to the program, students must meet college requirements and submit to the Plant Sciences Research Honors Committee a project proposal (two to three pages) that includes a title; a brief background of the problem (justification and literature review); a clear statement of objective(s) and hypotheses to be tested; methodology and experimental plan, necessary space, equipment and supplies; and a project budget. The proposal must be accompanied by a letter from the faculty supervisor stating that he or she has approved the project plan and that its completion within the remainder of the student's undergraduate tenure is feasible.

A brief progress report will be made to the committee usually during the third week of the spring semester. Research presentations are recommended (e.g., Cornell Undergraduate Research Board Spring Forum, department seminars, professional meetings).

Successful completion of the research honors program requires acceptance by the honors committee of two copies of a research report. The report should be written in the format of

a research publication in the appropriate scientific field. The acceptable report must have been reviewed and corrected according to the recommendations of the research supervisor before the report is submitted to the honors committee. The report must be received by the honors committee at least two weeks before the last day of classes of the semester in which the degree is sought and must be accompanied by a letter from the research supervisor evaluating the research and, if appropriate, recommending graduation with distinction in research.

The research honors committee will review the report within one week and may accept it or return it to the student with specific recommendations for revisions. A suitably revised version must be submitted to the committee before the second day of the examination period. When the committee accepts an honors report, the chair will recommend to the associate dean and director of academic programs and to the college registrar that the student be graduated with distinction in research. One copy of the accepted report will be returned to the student with review comments from the committee.

Students may volunteer to submit electronically to the honors committee chair a copy of their final approved thesis (in pdf or Word format) for Mann Library. Mann Library has given CALS the opportunity to have theses available to the public electronically if this does not interfere with other plans, such as patenting or publishing in another journal. A permission form to allow the thesis to be made available online at Mann Library can be obtained from the honors committee chair.

In addition, students are required to submit electronically to the honors committee chair their thesis title, research advisor's name, and abstract (in Word format). During each summer, the CALS Research Honors Abstracts publication is published (on the web beginning 2009) as a compilation of research honors thesis abstracts.

Additional guidelines may be found at www.css.cornell.edu/Programs/PlantSciHon.

Social Sciences

Social Sciences Program Area Faculty Committee: N. Chau, chair (NetID: hyc3); A. A. Gonzales, T. D. Park, and C. W. Scherer

Overview

Research projects in the social sciences include applied economics and management, communication, development sociology, education, and information science. Students are accepted into the social sciences research honors program of the College of Agriculture and Life Sciences after meeting all the college criteria described above, after evaluation of the student's written application, and on approval of a detailed thesis proposal.

The program provides an excellent opportunity for students to pursue independent study and research under the guidance/mentorship of a faculty member. Previously approved theses covered a wide range of topics and methodologies. A complete list can be found at <http://ecommons.library.cornell.edu/handle/1813/2937>.

Guidelines and Due Dates

A. Application and Proposal:

Students must submit one hard copy of the completed application and proposal to the social science program area faculty committee chair two semesters before their prospective graduation date (see deadlines below). Late applications will not be considered.

Graduation Date	Proposal Due Date
December 2009	February 16, 2009
May 2010	September 15, 2009
December 2010	February, 15, 2010
May 2011	September 15, 2010
December 2011	February 15, 2011

Students are strongly encouraged to meet with faculty during their junior year in order to identify someone to serve as their honors thesis advisor. Honors thesis faculty advisors must be members of the graduate faculty. Exceptions may be granted for persons with special expertise pending petition to the committee.

Working with their honors thesis advisor, students should begin developing their thesis proposal during the second semester of their junior year. The purpose of the proposal is twofold. First, it formalizes a plan of study and establishes a set of expectations between the student and the faculty advisor. Second, the honors committee reviews the proposal to determine whether it is consistent with honors thesis requirements and to make suggestions for improvement.

The proposal should be 5 to 10 typed, double-spaced pages and include the following:

1. **Research Topic:** State the problem to be studied or the topic of interest. Review the basic literature and the background of the problem or topic; include a more extensive bibliography to be consulted.
2. **Research Questions/Empirical Hypotheses:** Specify the proposed questions to be answered or hypotheses to be tested empirically via collection of data and a mode of analysis accepted in the social sciences.
3. **Research Methods:** Discuss the models to be constructed (if any), sampling procedures, data collection procedures (including measurement instruments and survey or experimental designs, if appropriate), and proposed methods of analysis.
4. **Expected Significance:** State what new knowledge or information is likely to be forthcoming and why it is important. State any practical applications expected as a result of the research.

Students accepted into the honors program should register for credit directed by the honors thesis faculty advisor (e.g., AEM 4991, COMM 4991, DSOC 4991, EDUC 4991).

B. Final Submission for Review and Approval Requirements:

Honors theses should be written according to the form of any standard journal within the appropriate field. Distinction in research is awarded upon approval of the research honors thesis by the committee. Both the results of the research and the methodology (or the logical argument by which the results were achieved) must be reported. Reviews of

the literature, practical conclusions or applications, or broad characterizations of an area of inquiry may constitute part of the research report but are not themselves sufficient as research.

The committee recommends the submission of the thesis draft to the research advisor two months before graduation to permit sufficient time for revision.

Completed theses are due approximately one month before graduation:

Graduation Date	Thesis Due Date
December 2009	November 16, 2009
May 2010	April 15, 2010
December 2010	November 15, 2010
May 2011	April 15, 2011
December 2011	November 15, 2011

One electronic copy of the final thesis (in pdf or Word format) should be sent by email to the Social Sciences program area faculty committee chair no later than the due date. A supporting letter from the faculty member supervising the work also must be submitted either electronically or as a hard copy.

The thesis will be independently reviewed typically by two faculty committee members within about two weeks. If further revisions are required, students will be informed and a revised draft will be requested. Students will be notified of the committee's decision by the week of May 25.

Students may volunteer to submit electronically to the honors committee chair a copy of their final approved thesis (in pdf or Word format) for Mann Library. Mann Library has given CALS the opportunity to have theses available to the public electronically if this does not interfere with other plans, such as patenting or publishing in another journal. A permission form to allow the thesis to be made available online at Mann Library can be obtained from the honors committee chair.

In addition, students are required to submit electronically to the honors committee chair their thesis title, research advisor's name, and abstract (in Word format). During each summer, the CALS Research Honors Abstracts publication is published (on the web beginning 2009) as a compilation of research honors thesis abstracts.

OFF-CAMPUS OPPORTUNITIES

Study off campus is of two types: (1) credit may be earned at another institution and transferred to Cornell, or (2) credit may be earned in Cornell courses that require off-campus activity.

Students who plan to enroll in courses at another institution should refer to the non-Cornell credit policies on p. 37. Information about enrolling at another institution outside of the United States can be found under "Study Abroad."

Albany Programs

Study off campus in Albany, the New York State capital, provides a unique opportunity to combine career interests with academic and legislative concerns. Two formalized opportunities are available. The Assembly Intern Program is offered in the spring semester and provides placement with a staff member of the New York State Assembly. The

Senate Assistants Program also occurs during the spring semester and has placements with New York State senators and selected staff. Each program has an academic component as well. Check the individual folders in the internship files in the CALS Career Development Office, 177 Roberts Hall.

Applications are collected and processed by the CALS Career Development Office, 177 Roberts Hall, in the semester before assignments. Those accepted should plan a program of study in consultation with their faculty advisor. At least 12 credits must be carried to meet the full-time residency requirement. To receive academic credit for the Assembly Intern Program, students enroll in ALS 3920. To receive academic credit for the Senate Assistants Program, students enroll in ALS 4960. Information and applications are available in the CALS Career Development Office, 177 Roberts Hall.

Cornell in Washington

The Cornell in Washington program offers students in all majors an opportunity to earn full academic credit for a semester in Washington, D.C. Students take part in a public policy or humanities seminar, serve as externs in federal agencies, congressional offices, or nongovernmental organizations, carry out individual research projects, and take one or two electives. The required externships and all course enrollments are arranged through, and approved by, the Cornell in Washington program. Students in the College of Agriculture and Life Sciences must register for ALS 4998 and cannot receive credit for the externship experience alone. For further information, see p. 22, inquire at M101 McGraw Hall, 255-4090, or visit ciw.cornell.edu.

Marine Biological Laboratory's (MBL) Semester in Environmental Science

The Marine Biological Laboratory's (MBL) Semester in Environmental Science is a semester-long program held each fall in Woods Hole, Mass. This is a multi-university and college program run by the staff of the Ecosystems Center of the MBL. Approximately 15-20 students interact intensively with the world-class research staff of the Ecosystems Center in a mixture of classroom, laboratory, and field-research activities. The major foci of the program are on biogeochemistry, ecosystem science, and the impacts of land use and global change on the environment. Students spend about 20 hours each week conducting intensive, hands-on field and lab work in coastal forests, freshwater ponds, and estuaries, and complete an independent research project as part of the curriculum. The MBL is one of the oldest (founded in 1888) and most distinguished biological field stations in North America. Cornell credit for up to 16 credits is offered. More information on the program can be obtained from the Cornell faculty liaison (Prof. Bob Howarth, E309 Corson Hall, 255-6175) or from the director of the program (Dr. Ken Foreman, MBL Ecosystems Center, 508-289-7777; courses.mbl.edu/SES).

SEA Semester

The Sea Education Association is a nonprofit educational institution offering ocean-focused academic programs and the opportunity to live, work, and study at sea. Science, the humanities, and practical seamanship are

integrated in small, personal classes. The 17-credit program is 12 weeks in length. Courses are directly transferrable and listed in *Courses of Study* under BIOSM. Six weeks are spent in Woods Hole, Mass., and the following six weeks are spent on either one of SEA's two sailing research vessels: the *SSV Robert Seamans* or the *SSV Corwith Cramer*. SEA offers four unique programs. SEA Semester: Ocean Exploration, SEA Semester: Oceans and Climate, SEA Semester: Documenting Change in the Caribbean, and SEA Semester: Sustainability in Polynesian Island Cultures and Ecosystems. SEA Semester: Ocean Exploration is also offered as a 12-credit, eight-week summer program. For more information, contact Sea Education Association, P.O. Box 6, Woods Hole, MA 02543 (1-800-552-3633 x 770) or visit www.sea.edu. CALS students should file an intent to study off campus form with the college registrar as early as possible to ensure proper registration and enrollment in courses.

Shoals Marine Laboratory (SML)

The Shoals Marine Laboratory, run cooperatively by Cornell University and the University of New Hampshire, is a seasonal field station located on 95-acre Appledore Island off the coast of Portsmouth, N.H., in the Gulf of Maine. SML provides a unique opportunity to study marine science in a setting noted for its biota, geology, and history. Please refer to "Courses in Marine Science," in the section Shoals Marine Laboratory (BIOSM), for a list of courses offered.

For more information, contact the Shoals Marine Laboratory office, G14 Stimson Hall, 255-3717, or visit www.sml.cornell.edu.

Internships

Several departments in the college offer supervised internships for academic credit. Internships may be granted for pay and/or credit with a limit of up to 3 credits per internship and no more than 6 credits total allowed for internships consisting of off-campus work experiences that do not have the continued presence of a Cornell faculty member. The number of credits awarded should reflect the amount of knowledge gained per internship and/or following the CALS guidelines for assigning credits. The 6-credit allotment includes transfer credit and credit from other internships in other colleges at Cornell. The 6-credit limit does not apply to secondary, post-secondary, and Cooperative Extension teaching internships in the Department of Education. The awarding of credit will not be allowed in cases where a student brings to the college or to a professor a description of a past experience and requests credit. Note that a maximum of 15 (prorated for transfer students) of the 120 credits required for the degree may be taken in internships, independent study courses, and undergraduate teaching or research. For internships not governed by an established internship course, the student must enroll in a 4970-level course for the number of credits assigned.

To ensure a fair and manageable system to deal with internships, the College of Agriculture and Life Sciences has set forth guidelines to serve as minimum requirements for a student to receive internship credit.

1. Credit will be assigned or accepted only in cases in which a Cornell faculty member is directly involved in determining both the course content and in evaluating the student's work.
2. The internship should be purposeful, provide opportunities for reflection, present a continual challenge to the student, and incorporate active learning, with the student an active participant in all stages of the experience from planning to evaluation.
3. Before a student begins the internship, a learning contract needs to be written between the Cornell faculty internship advisor on campus, the supervisor at the location, and the student. This contract should state the conditions of the work assignments, supervisor, learning goals, number of credits, and methods of evaluation of the work. A contract form can be obtained from the college Registrar's Office, or departments may have their own.
4. Students should further develop the internship experience based on the college Experiential Learning Criteria, which can be found at cals.cornell.edu/cals/teaching/elr.
5. Students need to keep their faculty internship advisor updated on the progress of the internship while away from campus.

Arrangements should be made with the offering department for assignment of a faculty mentor for planning the program of work and for evaluating student performance. Individual departments may add more requirements to the internship based on specific needs such as time constraints, faculty workloads, and the relationship of the internship to the goals of the department. The specific terms of the contract should be recorded, using the independent study, research, teaching, and internship form, available in 140 Roberts Hall.

Pay and Credit for Undergraduate Research, Teaching, and Internships

Research: students can receive pay or credit or they can partition it so that they receive pay for part of the research and credit for the other as long as the work does not overlap.

Undergraduate Teaching Assistant: students can receive either pay or credit, but they cannot partition it.

Internships: students may receive both pay and credit for the same internship experience.

Study Abroad

Each year almost 200 CALS undergraduates spend a semester or year studying abroad. Students enroll directly in universities in Australia, participate in fieldwork in Africa, or explore the wonders of a foreign city while participating in an internship. CALS recognizes that students study abroad for a variety of reasons and, as a result, offers a great deal of choice for its students. Students may want to study abroad to broaden their worldview, boost employment prospects, learn a new language, gain independence, discover a new educational system, or all of the above! A variety of options is available. Students can choose from:

- a CALS exchange program in a variety of universities around the world that have been created especially for CALS students. For a list of the programs available, visit www.cals/current/abroad-exchange/index.cfm;
- a study abroad program through the Cornell Abroad office;
- an international study tour as part of a CALS course, or a summer program.

CALS exchange programs are unique agreements created with other prestigious universities around the world. CALS students participating in an exchange program pay only their Cornell tuition, with no additional administrative fees.

Study abroad opportunities offered through the Cornell Abroad office are vast, ranging from a traditional university in London to field study in Africa. For information about specific programs, costs, and more, visit their office in 300 Caldwell Hall or go to www.cuabroad.cornell.edu.

Whether participating in a CALS exchange or a program through Cornell Abroad, all CALS students interested in studying abroad must receive approval from their faculty advisor and meet with the college study abroad advisor to review the college policies and to receive college approval. College policies can be viewed at www.cals.cornell.edu/cals/current/abroad-exchange/index.cfm.

Study abroad advising hours are held in the Counseling and Advising Office, 140 Roberts Hall.

Ithaca College and Wells College Exchange Programs

The Cornell University-Ithaca College Exchange Program is a reciprocal arrangement that allows matriculated full-time students, with prior approval and within stated stipulations, to cross-register at the other institution. No additional tuition is charged except in the case of undergraduate students enrolled during any one semester for a total of more than 18 credits (Cornell and Ithaca College combined). Those students are subject to additional tuition charges on a per-credit basis. This arrangement is available during the fall and spring semesters only and is contingent upon space availability. A maximum of 12 credits may be taken through this program.

Cornell University also has a reciprocal arrangement with Wells College in Aurora, N.Y. For further information, contact the Cornell School of Continuing Education office, B20 Day Hall, 255-4987, or on the web at www.sce.cornell.edu/exmu.

GRADUATION REQUIREMENTS FOR THE BACHELOR OF SCIENCE

Graduation Requirements

1. Credit Requirements

- A. Minimum total credits: 120 academic credits are required for graduation.

Important Exceptions:

- Repeated courses increase the number of credits required for graduation by the number of credits in the course. These credits *do* count toward the minimum 12 credits required for full-time status.
 - Review or supplemental courses (e.g., 1000- to 1099-level) increase the number of credits required for graduation by the number of credits in the course. These credits *do not* count toward the minimum 12 credits required for full-time status.
 - Physical education courses *do not* count toward 120 credits for graduation. They *do not* count toward the minimum 12 credits required for full-time status.
- B. Minimum credits at Cornell: 60 academic credits must be completed at Cornell.
 - C. Maximum non-Cornell credits: 60 non-Cornell credits (AP, CASE, transfer, Cornell Abroad, and exchange credits) can be applied toward degree requirements.
 - D. Minimum credits from College of Agriculture and Life Sciences: 55 CALS credits are required for graduation. CALS credits include all courses from departments within CALS and courses offered in the Biological Sciences, Earth and Atmospheric Sciences, Information Science, and Nutritional Sciences Departments. Specifically, courses offered under the following subject prefixes count as CALS credits: AGSCI, AIS, ALS, AEM, ANSC, BEE, BIOG, BIOAP, BIOBM, BIOEE, BIOGD, BIOMI, BIOMS, BIONB, BIOPL, BIOSM, BTRY, COMM, CSS, DSOC, EAS, EDUC, ENTOM, FDSC, HORT, IARD, INFO, LA, NS, NTRES, PLBR, PLPA, SNES, VIEN.
 - E. Maximum 55 endowed credits: CALS students are limited to 55 credits from the endowed colleges. If an academic program requires additional credit, permission may be requested by contacting the CALS Registrar's Office (607-255-2017, 140 Roberts Hall, cals_registrar@cornell.edu).
 - F. Minimum letter-graded credits: 100 (prorated based on non-Cornell credits).*
 - G. Maximum credits earned through independent study, research, teaching assistantships, and/or internships: 15 credits of "unstructured" course work can be applied toward graduation requirements (prorated based on non-Cornell credits) (i.e., a minimum of 100 "structured" credits are required for graduation).

*The prorated formula is available at www.cals.cornell.edu/current/registrar.

2. Physical Education Requirement

- A. Pass two PE courses with a satisfactory grade.
Exception: External transfer students are credited with one course of physical education for each semester previously enrolled full-time (12 or more credits) at another college before matriculation.
- B. Pass a required swim test, administered during orientation. External transfer students who are exempt from PE are exempt from the swim test.

- C. Students are expected to complete the physical education requirement in their first two semesters at Cornell.

3. Residency Requirements

- A. Eight semesters of full-time study are expected. Transfer students are credited with one semester in residence for each 15 credits earned at another institution.
- B. Internal transfer students must be enrolled in CALS for at least two semesters, not including residency in the Internal Transfer Division.
- C. The final semester before graduation must be completed in a Cornell program as a full-time student in continued good academic standing.
- D. Students in the ninth and final semester may apply for prorated tuition. The eligibility criteria are listed below. The student will be charged the full administrative fee and student service charge, plus one-fifteenth of the remaining full tuition per credit hour.

All of the following conditions must be met in order for a student to be considered for prorated tuition:

1. The prorated semester is the ninth and final semester of study.
2. The student is in good academic standing with the college and the major.
3. Maximum of 11 credit hours of course work are allowed under prorated tuition. Students cannot exceed the number of credits approved or full tuition will be charged, and no refund will be allowed if fewer credits than applied for are completed.
4. Approval of the student's faculty advisor, the college registrar, and the university registrar is required for all requests. Note that approval is conditional until grades are finalized at the end of the semester immediately preceding the prorated semester. Should those grades indicate that more than the requested number of prorated tuition credits are required for graduation, prorated tuition will be adjusted accordingly.
5. Students applying to be prorated in the fall semester are encouraged to submit the application by May 1. The final deadline is June 1. Students applying to be prorated in the spring semester are encouraged to submit the application by December 15. The final deadline is January 15.

Please be advised that prorated tuition may impact the student's financial aid, student loans, scholarships, non-Cornell health insurance programs, athletic eligibility, or other considerations. It is the responsibility of the student to resolve and rectify these situations prior to submitting this petition.

4. Grade-Point Average (GPA) Requirements

Minimum cumulative GPA: 2.00 or above must be maintained. The cumulative GPA includes all grades earned at Cornell.

5. Schedule Requirements

- A. Students are expected to enroll in at least one CALS course each semester until 55 CALS credits have been earned.

- B. Freshmen may not enroll in more than 18 credits, not including physical education.
- C. Freshmen are limited to one S-U course per semester.
- D. PE and supplemental course work do not count toward the 12-credit minimum required for full-time status.
- E. To add more than 18 academic credits to a student's schedule, advisor permission must be obtained through an add/drop slip to add more course work.

6. Distribution Requirements

The purpose of the distribution requirement is to provide a broad educational background and to ensure a minimum level of competency in particular skills. Through study of the physical and life sciences, students develop their understanding and appreciation of the physical sciences, enhance their quantitative reasoning skills, and gain an appreciation of the variability of living organisms. The social sciences and humanities give students perspective on the structure and values of the society in which we live, and prepare them to make decisions on ethical issues that will affect their work and role in society. Written and oral expression is designed to help students become competent and confident in the use of oral and written communication to express themselves and their ideas.

Please note: Credits received for independent study, field, teaching, research, work experience, and internships cannot be used to fulfill the distribution requirement. Courses judged to be review or supplemental in the discipline, such as 1000- to 1099-level courses, will not be counted in the distribution areas.

Physical and Life Sciences. 18 credits in at least three disciplines of which 6 credits must be introductory biology and 3 credits in chemistry or physics.

Introductory Biology: BIOG 1101-1104, 1105-1106, 1107-1108, 1109-1110, BIOSM 1110 (summer)

Beginning fall 2008, students majoring in Applied Economics and Management, Communication, Development Sociology, Information Science, and Landscape Architecture have the option of fulfilling 6 credits of introductory biology by either taking courses listed above or newly developed courses. See www.cals.cornell.edu/cals/current/registrar/current-students/cals-graduation/biology.cfm for the most up-to-date list of courses. Students should consult with their advisors to clarify major requirements.

CHEM

PHYS

Other Physical/Life Sciences

AEM 2100

ANSC 1100, 1120, 1160, 2120, 2150, 2210, 2400, 2410, 3200, 3700, 3920, 3980

ASTRO

BEE 4540, 4590

Biological Sciences (any course EXCEPT BIOG 2000, 2990, 4980, 4990, and BIONB 4310, BIOSM 2040, and BIOAP 4980, BIOBM 4980, BIOEE 4980, BIOGD 4980, BIONB 4980, BIOPL 4980)

BTRY/Statistics

CHEM

CSS 1900, 2110, 2600, 3150, 3170, 4050, 4140, 4440, 4551-4555, 4660, 4830

EAS (EXCEPT 2900)

ENTOM 2010, 2100, 2120, 2150, 2410, 2600, 3070, 3150, 3250, 3310, 3311, 3690, 4440, 4550, 4630

FDSC 2000

HADM 2010

HORT 2200, 2430, 3170, 4000, 4260, 4400, 4450, 4490, 4551-4555, 4600

IARD 4050, 4140

ILRST 2100, 2120, 3100

Mathematics—See CALS requirements for graduation.

NS 1150, 1220, 2220, 3200, 3310, 3320, 3410, 3470, 3610, 4310, 4410, 4520

NTRES 1101, 2010, 2100, 2830, 3100, 3130, 3140, 3141, 3220, 3260, 4130, 4200, 4201, 4220

PAM 2100

PHYS

PLBR 2010, 2250, 4010, 4011, 4030, 4040, 4050

PLPA 2010, 3010, 3090, 3190, 3290, 4330, 4430, 4480

SNES 1101

Social Sciences and Humanities. Students must complete four courses of 3 or more credits each from the following seven categories of courses in the humanities and social sciences.

- At least one course must be completed from three different categories.
- No more than two courses in the same department will be counted toward the distribution requirement.
- For freshmen entering in fall 2008 or later, one course MUST be in the human diversity (D) category.

Categories:

- Cultural Analysis (CA)
- Human Diversity (D)
- Historical Analysis (HA)
- Knowledge, Cognition, and Moral Reasoning (KCM)
- Literature and the Arts (LA)
- Social and Behavioral Analysis (SBA)
- Foreign Language (FL)

Detailed descriptions follow.

Social Sciences and Humanities: Category Descriptions

Cultural Analysis (CA)

These courses study human life in particular cultural contexts through interpretive analysis of individual behavior, discourse, and social practice. Topics include belief systems (science, medicine, religion), expressive arts and symbolic behavior (visual arts, performance, poetry, myth, narrative, ritual),

identity (nationality, race, ethnicity, gender, sexuality), social groups and institutions (family, market, community), power and politics (states, colonialism, inequality).

Historical Analysis (HA)

These courses interpret continuities and changes—political, social, economic, diplomatic, religious, intellectual, artistic, scientific—through time. The focus may be on groups of people, dominant or subordinate, a specific country or region, an event, a process, or a time period.

Knowledge, Cognition, and Moral Reasoning (KCM)

These courses investigate the bases of human knowledge in its broadest sense, ranging from cognitive faculties shared by humans and animals such as perception, to abstract reasoning, to the ability to form and justify moral judgments. Courses investigating the sources, structure, and limits of cognition may use the methodologies of science, cognitive psychology, linguistics, or philosophy. Courses focusing on moral reasoning explore ways of reflecting on ethical questions that concern the nature of justice, the good life, or human values in general.

Literature and the Arts (LA)

These courses explore literature and the arts in two different but related ways. Some courses focus on the critical study of artworks and on their history, aesthetics, and theory. These courses develop skills of reading, observing, and hearing and encourage reflection on such experiences; many investigate the interplay among individual achievement, artistic tradition, and historical context. Other courses are devoted to the production and performance of artworks (in creative writing, performing arts, and media such as film and video). These courses emphasize the interaction among technical mastery, cognitive knowledge, and creative imagination.

Social and Behavioral Analysis (SBA)

These courses examine human life in its social context through the use of social scientific methods, often including hypothesis testing, scientific sampling techniques, and statistical analysis. Topics studied range from the thoughts, feelings, beliefs, and attitudes of individuals to interpersonal relations between individuals (e.g., in friendship, love, conflict) to larger social organizations (e.g., the family, society, religious or educational or civic institutions, the economy, government) to the relationships and conflicts among groups or individuals (e.g., discrimination, inequality, prejudice, stigmas, conflict resolution).

Foreign Language (FL)

These courses are taught by the following departments: Africana Studies and Research Center (ASRC—language only), Asian Studies (BENGL, BURM, CHIN, HINDI, INDO, JAPAN, KHMER, KOREA, SANSK, TAG, THAI, and VIET), Classics (CLASS—language only), German Studies (GERST—language only, DUTCH, and SWED), Linguistics (LING—languages only), Near Eastern Studies (NES—languages only), Romance Studies (CATAL, FREN, ITAL, PORT, QUECH, and SPAN), and Russian Studies (RUSSA, HUNGR, POLSH, SEBCR, and UKRAN).

Human Diversity (D)

These courses address several of the college's stated goals for undergraduate education, specifically, the expectation that in the course of earning a degree, students will enhance their abilities to communicate with people of different cultural perspectives; to listen carefully and respectfully to the views of others, especially views with which they disagree; and to employ ethical reasoning in judging ideas, actions, and their implications. These courses explore the challenges of building a diverse society, and/or examine the various processes that marginalize people and produce unequal power relations in terms of race, nationality, ethnicity, sexuality, religion, gender, age, or economic status.

Written and Oral Expression. 9 credits total, of which at least 6 must be in written expression. Oral expression is not required by the college (it may be for some majors); all 9 credits may be in written expression. Courses in written and oral expression may be selected from the following:

Oral Expression

COMM 2010, 2030

ENTOM 3350

Written Expression

First-Year Writing Seminars

AEM 2000

COMM 1310, 2630, 3520, 3600

ENGL 2800, 2810, 2880, 2890, 3820–3850, 3880, 3890

LA 2150

7. Quantitative Literacy Requirement

Faculty legislation requires minimum competency in quantitative literacy to complete a degree in the College of Agriculture and Life Sciences. This requirement can be satisfied in one of three ways:

- Earning a score of 4 or 5 on the AP Calculus exam; or
- Transferring an approved calculus or statistics course with a grade of “C” or better; or
- Taking an approved math or statistics course at Cornell.

A complete listing of approved math and statistics courses is available online at www.cals.cornell.edu/current/registrar. Pre-approval forms are available in CALS Registrar's Office.

Non-Cornell Credit Policies

1. Non-Cornell credit includes:

- advanced placement credit (see p. 8 for further details);
- credit earned at an accredited college or university;
- credit earned through the Ithaca College and Wells College Exchange Programs;
- credit earned through a Cornell Abroad or CALS exchange program.

2. Non-Cornell credit is accepted by CALS when:

- the credits are earned at an accredited institution;

- the credits do not duplicate course work already completed at Cornell;
- the credits are earned before matriculating into CALS or during the summer or winter session or through Cornell Abroad or an approved exchange program;
- the credits have not been applied toward high school graduation requirements (except for AP exam credit, see p. 8);
- the grade earned is “C-” or better; and
- an official transcript is sent directly to the CALS Registrar's Office from the college/university where the credits were completed.

*Please note: Cornell University does not accept credit for courses sponsored by colleges but taught in high schools to high school students, even if the college provides a transcript for such work. Students who have taken such courses may, however, earn credit by taking an appropriate examination as described on pp. 9–12 of this catalog. For CALS-specific policies, see *College Credit Earned While in High School*.*

3. A student may apply a maximum of 60 non-Cornell credits toward his or her graduation requirements.

- If more than 60 non-Cornell credits have been completed, the CALS Registrar's Office will work with the student to determine which credits best fulfill CALS graduation requirements.
- Advanced placement credits are limited to 30 credits.
- Cornell Abroad (not CALS exchange) credits are limited to 15 credits per semester, 30 per academic year.

4. Non-Cornell credits are recorded on the graduation summary and can be applied toward CALS credits, distribution requirements, and major requirements.

- Non-Cornell courses that are similar to courses offered in CALS are recorded as CALS credits on the graduation summary and count toward the minimum of 55 CALS credits required for graduation.
- Non-Cornell courses that are equivalent to Cornell courses that fulfill distribution requirements are recorded under the appropriate distribution area on the graduation summary.

- Non-Cornell courses that are equivalent to endowed courses can be applied toward distribution requirements or general electives; however, these credits do not count against the maximum of 55 endowed credit hours.
- If a course has no comparable course at Cornell, staff in the CALS Registrar's Office determine how the credit should be applied.

- Faculty advisors determine how non-Cornell credit will be applied toward major requirements; the CALS Registrar's Office determines how non-Cornell credit will be applied toward CALS graduation requirements.

5. Students who have already matriculated into CALS and are planning to take courses at another institution should

complete a transfer credit pre-approval form before completing the course work. Pre-approval forms are available in the CALS Registrar's Office in 140 Roberts Hall.

- During the regular academic year, students can be enrolled in courses at both Cornell and another institution only if the student is taking a course not offered at Cornell. (Schedule conflicts or unavailability of courses in a given semester do not constitute valid rationales for concurrent enrollment at another institution.)

College Credit Earned While in High School

If a student is enrolled in a college or university course during his or her high school years, transfer credit will be given only if all the following criteria are met:

- Course cannot be used to fulfill high school graduation requirements.
- Course/section must be a standard course available to all students registered in the college.
- If taught in a high school, the high school must be a satellite location, one of several options available to all students taking the course.
- Instructor must be a faculty member (includes adjunct) at the offering college.
- An official transcript must be sent to the CALS Registrar's Office by the offering institution. It is the student's responsibility to request an official transcript.
- Both the college form and high school form must be provided to confirm that all credit earned in high school meets these criteria. It is the student's responsibility to request that the college and high school complete these forms. Forms are available in the CALS Registrar's Office, 140 Roberts Hall.

Each condition must be met for credit to be accepted.

Appropriate AP exams identifying a student's understanding of the material indicated by achieving the scores outlined in *Courses of Study*, may be used to gain credit for course work that does not meet the criteria outlined above. In addition, students who have taken such courses may earn credit by taking an appropriate examination as described on page 8.

Graduation Procedures

- The progress of each student toward meeting the degree requirements is recorded each semester in the CALS Registrar's Office on a graduation summary. Students can review their graduation summary online at <https://dust.cals.cornell.edu> under degree progress.
- Students who have been in residence for eight semesters and who have met the graduation requirements will be graduated. Students are expected to attend for the full eight semesters even if they have completed the graduation requirements in fewer semesters. A student who wishes to either graduate

early or delay graduation must complete an additional application with the CALS Registrar's Office.

- Application to graduate. In the first semester of their senior year, students must complete and file an application to graduate with the CALS Registrar's Office.

Deadlines to File the Application to Graduate:

January graduates: October 16

May graduates: December 18

Failure to meet these deadlines could result in a student's name being omitted from the commencement program and/or a diploma not being available for pickup on commencement Sunday.

Student Responsibilities: It is the student's responsibility to complete Part I of the Application to Graduate available online at <https://dust.cals.cornell.edu>; schedule a meeting with your faculty advisor(s) to complete Part II of the application; submit Part II of the application to the CALS Registrar's Office, 140 Roberts Hall; seek clarification from your advisor and/or CALS Registrar's Office staff if graduation requirements are unclear; and retain a copy of the Application to Graduate for your records.

Note: If a student is completing more than one major and/or a minor, the student must meet with and complete Part II of the Application to Graduate with **all** advisors.

Faculty Advisor Responsibilities: It is the faculty advisor's responsibility to complete Part II of the Application to Graduate with the student, listing any outstanding requirements on the application (including courses in which the student is currently enrolled); and answer any student questions regarding major requirements.

CALS Registrar's Office Responsibilities: It is the responsibility of the CALS Registrar's Office to update the graduation summary of seniors before each student's final fall semester. The CALS Registrar's Office staff is available to review degree requirements during walk-in hours and by appointment.

Commencement Information: Commencement information will be provided to all graduating seniors directly by the Commencement Office. Information is also available at www.commencement.cornell.edu.

ACADEMIC POLICIES AND PROCEDURES

Registration

All students must register with the university at the beginning of each semester. In order to be considered a registered student by the university, a student must:

- complete course enrollment according to individual college requirements;
- settle all financial accounts, including current semester tuition;
- clear any holds, whether these are from the Bursar's Office, Gannett Health Center, the judicial administrator, or the dean of your college; and

- satisfy New York State health requirements.

Students can check their registration status using *Student Center*. The first screen in *Student Center* will indicate whether you are registered and will list any holds that need to be cleared, including the correct office to visit to have the holds removed. Students are expected to register by the fifth week of the semester. Failure to register may result in termination of your Cornell services such as, but not limited to, library access, meal plans, door access, Blackboard, and bus service. You may be considered withdrawn by the college. Only registered students are entitled to attend classes and have access to services.

Course Enrollment

Students will receive course enrollment information from the university registrar. After planning a schedule of courses in consultation with their faculty advisor, students pre-enroll by computer.

To enroll in courses that involve independent study, teaching, internships, or research, a student must file an independent study form, available in the CALS Registrar's Office, 140 Roberts Hall.

Repeated Courses

Students may enroll again for a course in which they received a grade of F in a previous semester. Both grades will be recorded and calculated as part of their cumulative GPA. If a student retakes a course in which a passing grade was earned, both grades will be recorded and calculated as part of their cumulative GPA. However, repeating a course increases the number of credits required for graduation by the number of credits in the course.

Incompletes

Students must *not* enroll again for a course in which they received an incomplete. Instead, work for that course should be completed without further enrollment. The instructor files a manual grade form with the college registrar when a grade has been assigned. An incomplete not made up by the end of two successive semesters of residence reverts to a failure. In the case of a graduating senior, incompletes revert to failures at the time of graduation.

Enrollment Changes

A student is held responsible for and receives a grade for those courses in which he or she enrolls unless the student officially changes such enrollment. All changes in courses or credit, grading options, or sections must be made by the student using the online add/drop through *Student Center* or the official course drop and add form at the CALS Registrar's Office, 140 Roberts Hall. Approval of the faculty advisor may be required to change course enrollment. Department or course instructor approval may be required for select courses.

Students may add courses and change grading options or credit hours where applicable during the first three weeks of the semester, and may drop courses until the end of the seventh week.

Academic Integrity Policy

The College of Agriculture and Life Sciences faculty, students, and administration support and abide by the university Code of Academic Integrity. Its principle is that absolute integrity is expected of every student in all academic undertakings: students must in no way misrepresent their work, fraudulently or unfairly advance their academic status, or be a party to another student's failure to maintain academic integrity.

The maintenance of an atmosphere of academic honor and the fulfillment of the provisions of the code are the responsibility of the students and the faculty. Therefore, all students and faculty members shall refrain from any action that would violate the basic principles of this code.

1. Students assume responsibility for the content and integrity of their submitted work, such as papers, examinations, or reports.
2. Students are guilty of violating the code if they
 - knowingly represent the work of others as their own.
 - use or obtain unauthorized assistance in any academic work.
 - give fraudulent assistance to another student.
 - fabricate data in support of laboratory or field work.
 - forge a signature to certify completion or approval.
 - submit the same work for two different courses without advance permission.
 - knowingly deprive other students of library resources, laboratory equipment, computer programs, or similar aids.
 - in any other manner violate the principle of absolute integrity.
3. Faculty members assume responsibility to make clear to students and teaching assistants specific regulations that apply to scholarly work in a discipline.
4. Faculty members fulfill their responsibility to
 - maintain in all class, laboratory, and examination activities an atmosphere conducive to academic integrity and honor.
 - make clear the conditions under which examinations are to be given.
 - make clear the consequences of violating any aspects of the code.
 - provide opportunities for students to discuss the content of courses with each other and help each other to master that content and distinguish those activities from course assignments that are meant to test what students can do independently.
 - state explicitly the procedures for use of materials taken from published sources and the methods appropriate to a discipline by which students must cite the source of such materials.

- approve in advance, in consultation with other faculty members, which work submitted by a student and used by a faculty member to determine a grade in a course may be submitted by that student in a different course.
- monitor the work and maintain such records as will support the crucial underpinning of all guidelines: the students' submitted work must be their own and no one else's.

Cornell's Code of Academic Integrity spells out how individuals who have allegedly violated Cornell standards for academic integrity are to be confronted and, if found to be in violation of those standards, sanctioned. The code provides informal resolution of most perceived violations through a primary hearing between the faculty member, the student involved, and an independent witness. If necessary, a hearing before a hearing board follows. The full code may be found at <http://cuinfo.cornell.edu/Academic/AIC.html>.

The Academic Integrity Hearing Board for the College of Agriculture and Life Sciences consists of three elected faculty members, three elected student members, a chair appointed by the dean, and the director of counseling and advising, who serves as a nonvoting record keeper. Professor Dale Grossman is the current chair.

Individuals who observe or are aware of an alleged violation of the code should report the incident to the faculty member in charge of a course or to the chair of the hearing board. General information and details on procedures for suspected violations or hearings are available from the Counseling and Advising Office, 140 Roberts Hall.

Academic Honors

The college encourages high academic achievement and recognizes outstanding students in several ways:

1. **Dean's List.** Each semester, students are recognized for academic excellence by inclusion on the Dean's List. Eligibility for the Dean's List in the College of Agriculture and Life Sciences is determined by the following criteria:
 - a. a minimum course load for the semester of 12 letter-graded credits;
 - b. completion of at least one CALS course;
 - c. achievement of a semester GPA of at least 3.50; and
 - d. achievement of an S grade, or a C- or better grade in each course (including physical education), with no incompletes. Dean's List will be granted retroactively if students meet all the requirements after successful course completion to make up INC grades.
2. **Bachelor of Science with Honors**
 - a. Students receiving a cumulative GPA of 4.00 or greater (based on the cumulative Cornell GPA) will graduate "summa cum laude."
 - b. Students receiving a cumulative GPA of greater than or equal to 3.75 and less than 4.00 (based on the cumulative Cornell GPA) will graduate "magna cum laude."
3. **Bachelor of Science with Distinction in Research.** Students will graduate with a bachelor of science degree with distinction in research when, in addition to having completed all the graduation requirements, they have satisfactorily completed the research honors program in their area of interest and have been recommended for the degree by the honors committee of that area. Special requirements are given in the section on the Research Honors Program.
4. **Ho-Nun-De-Kah**, founded in 1929, is the undergraduate honor society of the College of Agriculture and Life Sciences. Members are recruited from the top 20 percent of the senior class and top 15 percent of the junior class. In keeping with the ideals of encouraging scholarship, leadership, and citizenship, members provide free tutoring and a variety of service activities to both the college and the community. Visit Ho-Nun-De-Kah's web site at www.rso.cornell.edu/hndk.
5. **Golden Key** is an international honor society that recognizes and encourages scholastic achievement and excellence in all undergraduate fields of study. Juniors and seniors in the top 15 percent of their class are invited to membership. Visit Golden Key's web site at www.rso.cornell.edu/gkihs.

c. Students receiving a cumulative GPA of greater than or equal to 3.50 and less than 3.75 (based on the cumulative Cornell GPA) will graduate "cum laude."

Academic Standing

At the end of each semester, the Committee on Academic Achievement and Petitions reviews the records of those students who in any respect are failing to meet the academic requirements of the college or who persistently fail to attend classes. For students not making satisfactory progress, the committee takes appropriate action, including, but not limited to, issuing warnings, placing students on probation, granting students leaves of absence, advising students to withdraw, or suspending or expelling students.

Specifically, the committee considers as possible cause for action failure to attend and participate in courses on a regular basis or, at the end of any semester, failure to attain one or more of the following:

- semester GPA of at least 2.00
- cumulative GPA of at least 2.00
- satisfactory completion of 12 or more credits per semester
- reasonable progress toward completion of major and distribution requirements

In general terms, regular participation in course work with academic loads at a level sufficient to assure graduation within eight semesters and grades averaging C (2.00) or higher are prima facie evidence of satisfactory progress and good academic standing.

Petitions Procedures

The Committee on Academic Achievement and Petitions is a college committee of six faculty and two student members. On behalf of the faculty, the committee

- reviews, at the end of each semester and at other times as shall seem appropriate to the committee, the progress of students toward meeting graduation requirements.
- receives and acts on petitions from individual students asking for exceptions from particular academic regulations or requirements of the college, or for reconsideration of action previously taken by the committee.
- acts on readmission requests from persons whose previous enrollment was terminated by the committee.
- notifies the petitioner in writing of the action taken by the committee.

A petition for exemption from a college academic requirement or missed deadline may be filed by any student who has grounds for exemption. A petition is usually prepared with the assistance of a student's faculty advisor, whose signature is required. The advisor's recommendation is helpful to the committee. The committee reviews the written petition and determines whether there is evidence of mitigating and unforeseen circumstances beyond the control of the student that would warrant an exemption or other action.

Students wishing to withdraw from a course after the end of the seventh week must petition. Requests for course changes are approved only when the members of the committee are convinced that unusual circumstances are clearly beyond the control of the student. The committee assumes that students should have been able to make decisions about course content, total workload, and scheduling prior to stated deadlines. A grade of W (for "withdrawal") is recorded on the transcript if a petition to drop a course is approved after the end of the seventh week of classes and if an approved drop results in fewer than 12 credits.

Forms are available in the Counseling and Advising Office, 140 Roberts Hall. Counselors are available to assist with the process.

Leave of Absence

A student taking a break from studies in a future semester or who finds it necessary to leave the university before the end of a semester should submit a written petition for a leave of absence. Such action serves as appropriate notification to university offices and corrects the student's transcript.

An approved leave is considered a voluntary interruption in study and holds the student's place in the college without requiring reapplication to the university. Voluntary leaves are issued in two ways: unrestricted for students in good academic standing (no restrictions placed on length of leave up to five years, or activities pursued, and simple notification by student of intent to return), and restricted (length of leave and activities pursued may be specified, and a petition to return must be approved by the Committee on Academic Achievement and Petitions). A leave exceeding five years will require additional paperwork.

Information and petition forms are available in the Counseling and Advising Office, 140 Roberts Hall.

Withdrawal

A student who wishes to leave the university permanently should file a petition for withdrawal. Such petitions are approved if the student is in good academic standing. Students who have withdrawn and who later decide to return must apply to the CALS Admissions Office.

MAJOR FIELDS OF STUDY

The college curriculum consists of 24 major program areas that reflect the departmental academic effort in the college. Faculty curriculum committees in each area identify a sequence of courses appropriate to all students studying in that field. Courses of study are designed to provide systematic development of basic skills and concepts as well as critical thinking. Opportunity for concentration in an area of particular interest is usually available.

Programs are planned with considerable flexibility, allowing students to prepare for careers, graduate work, professional opportunities, and the responsibilities of educated citizens. Course requirements in each program area are different, but all students must meet the minimum distribution requirements of the college.

Agricultural Sciences

Agriculture is an exciting and dynamic field involving a wide range of disciplines. The Agricultural Sciences major trains students to be broad thinkers who are scientifically skilled and knowledgeable about socioeconomic issues related to agriculture and the environment. This interdisciplinary program is for students wishing to pursue a general education in agriculture to prepare for careers that require knowledge of food systems and natural resources. Such careers may include the production and marketing of plant/animal foods, agricultural education in secondary schools, organic farming, cooperative extension, and crop consultation. By providing students with focused categories of courses from which to choose, the Agricultural Sciences program is designed to allow students to work with their advisor in developing a curriculum that best fits the needs of each individual. The program allows students to focus on one or two areas of concentration while gaining a broad exposure to the agricultural courses across the college.

All students are required to take the core courses in sustainable agriculture, soil science, and integrated pest management, as well as gain practical experience by completing an internship and a "hands-on" experiential learning capstone course addressing real problems in agricultural science. Concentrations requiring at least 12 credits are available in Animal Science, Applied Economics and Management, Education and Communication, Crop Production and Management, and Sustainable Agriculture.

Students graduating with an Agricultural Sciences major will be trained to address complex global agricultural issues of today and will have a knowledge base that leads to employment in a variety of fields. The required emphasis on one or two concentration areas also allows students to

become experts in the area of agriculture that is most exciting to them.

Since students in the Agricultural Sciences program come from across the college, we create a family of students who take courses, study, learn, and discuss together as a group. We do this by organizing activities that facilitate learning in an interdisciplinary setting, such as inviting guest speakers from various sectors of the agricultural industry to lead discussions, offering professional development workshops to train students for the workforce, and hosting social events for students in the major. Opportunities are also available in research and outreach experiences, and in summer employment, which serve to enrich the students' practical experience.

Animal Sciences

The Animal Sciences program area offers a coordinated group of courses dealing with the principles of animal genetics, nutrition, physiology, management, and growth biology. Emphasis in subject matter is directed toward domestic animal species, dairy and beef cattle, horses, poultry, pigs, and sheep, while laboratory, companion, and exotic animal species are also included in research and teaching programs. The Department of Animal Science has extensive facilities for animal production and well-equipped laboratories and classrooms, including a teaching barn, in which students can gain practical experience in the care and management of large animals.

The program focuses on the application of science to the efficient production of animals for food, fiber, and pleasure and easily accommodates a variety of interests and goals. Beyond a core of basic courses (suggested minimum, 15 credits) students select production and advanced courses to fulfill an individually tailored program worked out in consultation with their advisor. In this way it is possible to concentrate by species as well as by subject matter (nutrition, physiology, growth biology, breeding, management). For each subject area, supporting courses in other departments are readily available and strongly encouraged. Many science-oriented students elect a program emphasizing supportive preparation in the physical and biological sciences appropriate to graduate, veterinary, or professional study following graduation. Dairy management is a popular program among students who may be preparing to manage a dairy business or enter a related career. Other students may elect a program oriented toward economics and business in preparation for a career in the poultry, dairy, meat-animal, horse, feed, or meats industry. These are examples of the flexibility within these programs that can be developed to meet a student's career interest related to animals.

It is recommended that students obtain appropriate fieldwork or animal experience during summers. Several special training opportunities exist for highly motivated students. Juniors and seniors whose academic records warrant it may, by arrangement with individual faculty members, engage in research (either for credit or honors) or assist with teaching (for credit). The Dairy Management Fellows Program offers an equally challenging but different type of experience for a select group of students.

Students declaring a minor in animal science will arrange for a formal academic advisor in animal science at least three semesters before graduating. It is expected that the minor will be satisfied by completing at least 12 credit hours of animal science courses (at least 6 of which must be taken at Cornell), the makeup of which will be determined in consultation with the advisor. For example, it is recommended that students completing the minor will assemble courses (or demonstrate having the equivalent from elsewhere) including some basic and applied biology of animals (anatomy, physiology, nutrition, genetics) along with a selection of intermediate or advanced offerings from the animal science curriculum. Satisfactory completion of minor requirements will be verified by the minor advisor's signature on the petition to graduate.

For information, contact Deloris Bevins in 149 Morrison Hall, dgb1@cornell.edu.

Applied Economics and Management

The Department of Applied Economics and Management (AEM) offers programs in general business, agribusiness, and applied economics. Its undergraduate degree is accredited by AACSB International—The Association to Advance Collegiate Schools of Business. Ten areas of specialization are offered in AEM: Accounting, Agribusiness Management, Applied Economics, Entrepreneurship, Environmental and Resource Economics, Finance, Food Industry Management, International Trade, and Development Marketing and Strategy.

Minors

Through the Department of Applied Economics and Management, CALS students may complete a minor program of study in one of eight different subject areas: Agribusiness Management, Business, Environmental and Resource Economics, Finance, Marketing, Food Industry Management, Applied Economics, and International Trade and Development. The minors consist of at least 18 credits of required course. Students should contact the Department of Applied Economics and Management for more detailed information and to enroll in one of these minor programs of study. These minors are not open to students outside CALS. For those lacking time to incorporate all the minor requirements during the regular school year, up to three of the required courses can be taken during summer session.

Atmospheric Science

Atmospheric science is the study of the atmosphere and the processes that shape weather and climate. The curriculum emphasizes the scientific study of the behavior of weather and climate, and applications to the important practical problems of weather forecasting and climate prediction. Students develop a fundamental understanding of atmospheric processes and acquire skill and experience in the analysis, interpretation, and forecasting of meteorological events. All students are required to complete a minimum of four semesters of calculus, two semesters of physics, and a semester each of chemistry, computer science, and statistics.

Atmospheric science courses are offered through the Department of Earth and Atmospheric Sciences (EAS). The requirements for the B.S. in atmospheric science through the College of Agriculture and Life Sciences are as follows:

1. **Atmospheric science:**
 - a. EAS 3410, 3420, 3520, 4470, 4510
 - b. See tracks listed below for additional required courses
2. **Mathematics, statistics, and computer science:**
 - a. MATH 1110, 1120, (1920 or 2130), 2930
 - b. AEM 2100 or equivalent
 - c. EAS 2900 or equivalent
3. **Basic physical sciences:**
 - a. PHYS 2207, 2208, or equivalent
 - b. CHEM 1560
4. **Tracks**

Operational required	Education required	Broadcasting required
EAS 2500	EAS 1310	EAS 1310
EAS 2960	EAS 1330	EAS 1330
EAS 4560	EAS 2500	EAS 2500
EAS 4700		EAS 2960
		EAS 4700
		COMM 2010

suggested	suggested	suggested
EAS 1310	EAS 1340	EAS 2680
EAS 1330	Courses in	EAS 1340
EAS 1340	(ASTRO, EAS)	
EAS 2680		minor in communication
EAS 3050	minor in	
EAS 4350	education	

Business required	Environmental required
EAS 1310	CHEM 2070
EAS 1330	CHEM 2080
EAS 2680	EAS 3340
	EAS 4570

suggested	suggested
minor in business	EAS 1310
	EAS 1330
	EAS 1340
	EAS 2500
	EAS 2680
	EAS 3050
	EAS 4350
	EAS 4830

It is recommended that students who are interested in graduate study in atmospheric science should take additional courses in mathematics and physics.

A student may minor in atmospheric science by completing any four of the following EAS courses*: 1310, 2500, 2680, 3050, 3340, 3410, 3420, 3520, 4350, 4470, 4510, 4560, 4570, 4700, 6510, 6520, or 6660.

*(two of the courses must be taken at Cornell.)

Courses satisfying the requirements for a major or minor in atmospheric science may not be taken S–U.

Biological Sciences

Biology is a popular subject at many universities for a variety of reasons: it is a science that is in an exciting phase of development; it prepares students for careers in challenging and appealing fields such as human and veterinary medicine, environmental sciences, and biotechnology; and it deals with the inherently interesting questions that arise when we try to understand ourselves and the living world around us. Many of the decisions we face today deal with the opportunities and problems that biology has put before us.

The major in biological sciences is available to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. The Office of Undergraduate Biology in 216 Stimson Hall provides student services that are available to students from either college.

The biology major is designed to enable students to acquire the foundations in physical and life sciences necessary to understand modern biology and to pursue advanced studies in a specific area of biology. Programs of study include either general biology or one of the following concentrations: animal physiology, biochemistry, computational biology, ecology and evolutionary biology, genetics and development, insect biology, molecular and cell biology, microbiology, neurobiology and behavior, nutrition, plant biology, and systematics and biotic diversity. Students interested in the marine sciences should consult the Shoals Marine Laboratory office, G14 Stimson Hall, 255-3717, for academic advising. For more details about the biology curriculum see the section in this catalog on biological sciences or visit www.biology.cornell.edu. For details regarding the minor in biological sciences, please refer to the Biological Sciences section of this catalog.

Biological and Environmental Engineering

The Department of Biological and Environmental Engineering (BEE) offers majors in biological engineering and environmental engineering. BEE faculty and students address three great challenges facing humanity today: ensuring an adequate and safe food supply in an era of expanding world population; protecting and remediating the world's natural resources, including water, soil, air, biodiversity, and energy; and developing engineering systems that monitor, replace, or intervene in the mechanisms of living organisms. The undergraduate engineering majors in the Department of Biological and Environmental Engineering have a unique focus on biological systems and the environment that is realized through a combination of fundamental engineering sciences, biology, engineering applications and design courses, and liberal studies. The program leads to a bachelor of science degree in biological engineering or environmental engineering, which is awarded jointly by the Colleges of Engineering and Agriculture and Life Sciences.

Engineering students take courses in mathematics, statistics, computing, physics, chemistry, basic and advanced biology, fundamental engineering sciences (solid mechanics, thermodynamics, fluid mechanics, and transport processes), engineering applications, and engineering design. They may select upper-level engineering courses in subjects that include bioprocessing, soil and water management, biotechnology applications, bioinstrumentation, engineering aspects of animal physiology, environmental systems analysis, and waste treatment and disposal. Students may further strengthen their programs by completing an engineering minor. Students preparing for medical school take additional lab-based courses in biology, biochemistry, and organic chemistry.

Throughout the curriculum, emphasis is placed on communication and teamwork skills and collaborative problem-solving.

Specific course requirements and other information for the biological engineering major and the environmental engineering major are described in the College of Engineering section of this publication.

Further information is also available at the undergraduate program office in BEE Student Services, 207 Riley-Robb Hall, or at www.bee.cornell.edu.

The department also offers technology concentrations in biological engineering technology and environmental engineering technology within the Interdisciplinary Studies Major in CALS. The technology concentrations emphasize technical applications of biological, environmental, physical, and life sciences. Students take courses in basic biological and physical sciences and mathematics, and choose electives in engineering and technology, agriculture, business, social sciences, and liberal studies.

Many engineering and technology students participate in undergraduate teaching and research, internships, independent study, project teams, and study abroad. Students should have a strong aptitude for the physical and life sciences and mathematics and an interest in the complex social issues that surround technology.

Career opportunities cover the spectrum of self-employment, private industry, public agencies, educational institutions, and graduate programs in engineering and science, as well as the professional fields like medicine, business, and law.

The living world is all around us and within us. The biological revolution continues and it has given rise to a growing demand for technical people who have strong math and science skills, who can communicate effectively, who are sensitive to the needs of people, and who are interested in the challenges facing society. The Department of Biological and Environmental Engineering is preparing the next generation to meet these challenges.

Specific course distribution requirements for the concentrations in biological engineering technology and environmental engineering technology include the following:

1. Basic Subjects	Credits
a. Calculus	8
b. Chemistry	7
c. Physics	8

d. Computer applications	4
e. Statistics or probability	3
f. Introductory biological sciences*	6-8
g. Written and oral expression*	9
h. Social sciences and humanities*	12

*Required of CALS majors.

2. *Advanced and Applied Subjects*

a. Five courses (15 credits) in the biological, environmental, or agricultural sciences	15
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b. Five courses (15 credits) in technology. Three courses from the list of approved technology courses.**	
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One course must be chosen from the list of approved laboratory courses.**

The lab course cannot double count as one of the three required technology courses	15
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**Contact department for a list of approved courses.

3. *Electives*

Additional courses to complete College of Agriculture and Life Sciences requirements

4. *Total (minimum)* 120

For further details on the biological and environmental technology concentrations, contact the BEE department undergraduate programs office at 207 Riley-Robb Hall, 607-255-2173 or at www.bee.cornell.edu.

Biology & Society

The Biology & Society program area is designed for students who wish to combine the study of biology with perspectives from the social sciences and humanities. Many of the most critical social issues of our time, from the implications of genetic engineering to the impact of global climate change, have biological processes at their core. At the same time these issues are inherently social, involving complex relationships among people, institutions, laws, and beliefs. The Biology & Society field of study provides the skills and perspectives necessary to confront problems with biological, social, and ethical dimensions. In consultation with a faculty member, students are expected to select their courses in the field to meet their own goals and interests. For a description of the Biology & Society requirements and courses, see "Biology & Society" under the College of Arts and Sciences in this publication or visit www.sts.cornell.edu.

Students who elect Biology & Society as their major field of study graduate from Cornell with well-developed writing and analytical skills and a knowledge base that can lead to employment in a variety of fields. Many graduates have accepted positions as health counselors, writers, or policy analysts and researchers for government organizations, medical institutions, consumer or environmental groups, or scientific research institutes. Students have found that Biology & Society is also excellent preparation for professional training in medicine, law, and health services administration and for graduate programs in such fields as genetic counseling, nutrition, clinical psychology, public health,

environmental studies, anthropology, sociology, and other related fields.

Admissions

Students in CALS may be admitted provisionally into this field of study when they apply to the college. Full admission depends on completing introductory biology and completing an application. Students transferring into this field of study will need to complete introductory biology and to submit an application during their sophomore year.

The application includes

1. a one- to two-page statement explaining the student's intellectual interests in Biology & Society and why it is consistent with his or her academic goals and interests.
2. a selected theme.
3. a tentative plan of courses fulfilling Biology & Society requirements, including courses taken and those planned.
4. a transcript of work taken at Cornell University and/or elsewhere, current as of the date of application.

The faculty admissions committee reviews applications twice a year, once each during the fall and spring semesters. A faculty advisor is assigned on admittance to the field. Approximately 60 faculty members from three colleges serve as advisors to Biology & Society students. The major program is coordinated for students in all colleges through the Biology & Society Office, 306 Rockefeller Hall, where students can get information, specific course requirements, and application forms. Faculty advisors are available to discuss the Biology & Society requirements.

Requirements for the program are listed below. A full description and listings of courses that satisfy the requirements can be obtained in 306 Rockefeller Hall or at www.sts.cornell.edu. See also "Biology & Society" in the College of Arts and Sciences section of this publication.

Biology & Society requirements:

1. Introductory biology (1101-1104, 1105-1106, or 1107-1108)
2. College calculus (one course)
3. Ethics (one course)
4. Two social sciences/humanities foundation courses
5. Three biology foundation courses
6. One biology depth course
7. Statistics (one course)
8. Core course
9. Five theme courses (a coherent group of five courses relevant to the student's special interest in Biology & Society, including a senior seminar that serves as a capstone course for the program).

Students should develop their theme and select their courses in consultation with a member of the Biology & Society faculty. A list of the faculty is available in 306 Rockefeller Hall. Further information may be obtained at www.sts.cornell.edu.

Biometry and Statistics

Quantitative prediction and interpretation are increasingly essential components of biological, physical, and social sciences. Complex patterns, structures, and interactions raise fundamental and fascinating questions that can be addressed only using mathematical, statistical, and computational methods. The wealth of data that can be acquired using modern methodologies to address these questions, in turn, requires substantive quantitative approaches to make possible appropriate analysis and interpretation. Computational power, meanwhile, continues to increase exponentially, providing the means for sophisticated analysis of complex phenomena.

The Biometry and Statistics major, in the Department of Biological Statistics and Computational Biology, focuses on the application of statistical and mathematical techniques to the sciences. Biometry applies statistics and mathematics to problems with a biological component, as seen in agricultural, environmental, biological, and medical science. Statistics is concerned with quantitative aspects of scientific investigation: design, measurement, summarization of data, and reaching conclusions based on probability statements. Students with ability in mathematics and an interest in its applications will find this a rewarding and challenging major.

The work of an applied statistician or computational biologist can encompass research, teaching, consulting, and computing in almost any combination and in a wide variety of fields of application. Opportunities for employment are abundant in academics, government, and businesses ranging from large corporations to small firms; salaries are usually excellent. Experience gained through summer employment, undergraduate research, or work as an undergraduate teaching assistant is highly recommended. For further details on the Biometry and Statistics major/minor, please contact the Director of Undergraduate Studies, Professor Steven J. Schwager (1194 Comstock Hall), at sjs5@cornell.edu or go to www.bsbc.cornell.edu.

Requirements for the Major (beyond the college requirements)

Nine core courses, plus either the Statistics or the Statistical Genomics concentration. Only courses for which the student receives a grade of C- or better will count toward the major in biometry and statistics.

Core Courses:

BTRY 3010 Biological Statistics I or
 BTRY 6010 Statistical Methods I
 BTRY 3020 Biological Statistics II or
 BTRY 6020 Statistical Methods II
 BTRY 4080 Theory of Probability
 BTRY 4090 Theory of Statistics
 MATH 1110 Calculus I
 MATH 1120 or 1220 or 1910 Calculus II
 MATH 2210 or 2230 or 2310 or 2940 Linear Algebra
 MATH 1920 or 2130 or 2220 or 2240 Multivariable Calculus

CS 1112 Introduction to Computer Programming or

BEE 1510 Introduction to Computing

Statistics concentration: Students must complete three advanced courses in statistics, computer science, operations research, or computational biology, including at least two from the list below (for complete list, go to www.bsbc.cornell.edu/majReq.php):

BTRY/ILRST 3100 Statistical Sampling

BTRY/ILRST 4100 Multivariate Analysis

BTRY 4790/CS 4782 Probabilistic Graphical Models

BTRY 4820 Statistical Genomics

BTRY 4830 Quantitative Genomics and Genetics

BTRY 4840 Computational Genomics

BTRY 4940 Special Topics (as appropriate)

BTRY 6030/ILRST 4110 Statistical Methods III: Categorical Data Analysis

BTRY 6040/ILRST 4140 Statistical Methods IV: Applied Design

BTRY 6150 Applied Functional Data Analysis

ILRST 6140 Structural Equations

ILRST 6190 Hierarchical Linear Models

NTRES 4110 Quantitative Ecology and Management of Fisheries Resources

NTRES 4120 Wildlife Population Analysis

NTRES 6700 Spatial Statistics

ORIE 3510 and 4520 Stochastic Processes

ORIE 4740 Statistical Data Mining

ORIE 5550 Applied Time-Series Analysis

Statistical genomics concentration: Students must complete two courses from BTRY 4820 Statistical Genomics, BTRY 4830 Quantitative Genomics and Genetics, and BTRY 4840 Computational Genomics; BIOGD 2810 Genetics; and in addition, they must complete one course from the advanced courses previously listed (for complete list go to www.bsbc.cornell.edu/majReq.php).

Supplementary concentration: Each biometry and statistics major is strongly encouraged to supplement the required courses with a concentration in an area of interest to the student, consisting of a cohesive set of courses chosen by the student. It is the student's responsibility to develop this concentration, with advice from the faculty, particularly the student's faculty advisor. It will be helpful to discuss the selection of courses with the director of undergraduate studies or undergraduate advising coordinator of a department closely linked with the chosen concentration.

The Minor

A minor in biometry and statistics is available to all undergraduate students in CALS. To complete the program, students must submit a minor program of study form, available in 1198 Comstock Hall. Each student will retain a copy of the form and will be responsible for planning the minor program of study in conjunction with the advisor in the student's major and a BSCB faculty advisor. Students and advisors in other departments should contact the director of undergraduate studies in the Department of Biological Statistics and

Computational Biology if they have general questions about Biometry and Statistics courses or the minor. A BSCB faculty member will supervise and assist each minor in course selection.

Requirements for the minor

BTRY 3010 Biological Statistics I or BTRY 6010 Statistical Methods I

BTRY 3020 Biological Statistics II or BTRY 6020 Statistical Methods II

BTRY 4080 Theory of Probability

BTRY 4090 Theory of Statistics

MATH 1110 Calculus I

MATH 1120 or 1220 or 1910 Calculus II

MATH 1920 or 2130 Multivariable Calculus or

MATH 2210–2220 or 2230–2240 Linear Algebra and Multivariable Calculus

One additional statistics elective from the advanced statistics course list given above.

A minimum of 31 credits is needed to complete the minor. Only courses for which the student receives a grade of C- or better will count toward the minor in biometry and statistics.

Communication

Communication majors at Cornell study communication in three main areas: science, media, and technology. Students gain a strong core in the theory of communication processes, including attitude, knowledge, and behavior change, public opinion, and information systems. They develop applied oral and written communication skills; they learn how communication systems work in society and in their personal and professional lives; they apply their understanding of communication to solving problems, sustaining the environment, reaching the public with new knowledge, and managing intricate networks of technologies.

Communication majors learn how

- communication influences attitudes, opinions, and behaviors
- mass media work in our society
- to use, evaluate, and design communication technologies
- to apply their understanding of communication to solving problems in science, the environment, government, industry, health, and education

The communication major is a program with a strong core of contemporary communication knowledge, theory, and practice.

Required freshman courses

Fall semester

COMM 1101 Cases in Communication

Spring semester

COMM 1300 Visual Communication

COMM 1310 Writing about Communication

This set of courses provides students with a basic understanding of communication and communication processes.

Required sophomore courses

COMM 2010 Oral Communication

COMM 2820 Research Methods in Communication Studies

Two of the four Focus Area introductory courses:

COMM 2200 Media Communication

COMM 2450 Communication and Technology

COMM 2760 Persuasion and Social Influence

COMM 2850 Communication, Environment, Science, and Health

After completing the courses in the core curriculum, all majors take an additional 18 credits in communication distributed among advanced writing and presentation courses, electives, and focus area requirements. Students must also complete 3 credits of college-level statistics. In consultation with their advisers, students concentrate in one of four defined focus areas appropriate to specific educational and career goals.

1. *Communication, environment, science, and health (CESH)*: Students focusing in CESH will investigate how communication influences public understanding of science, health, environmental, and risk-related issues. While exploring conceptual and theoretical issues, students will learn specific skills for communicating science, health, environmental, and risk information to a variety of audiences. Possible career paths include public information officer, science writer, environmental educator/outreach specialist, environmental or health-risk communicator, and business, legal, and other graduate study.
2. *Communication media studies (CMS)*: Students focusing in CMS will investigate the forces that shape media in contemporary society, investigating how what we see and hear comes to be. They will also analyze and understand the psychological, social, and cultural processes that are in turn affected by media, from politics to entertainment to news to the very question of what we understand as real about ourselves and true about the world around us. Students may pursue careers in the media industries, in designing the laws and policies regarding media, in business, legal, or other graduate study, or in the service of making media better; most of all, they will be more informed and astute citizens in a highly mediated world.
3. *Communication and information technologies (CIT)*: Students focusing in CIT will explore the social and psychological dimensions of the design, use, and evaluation of communication and information technologies, how people form and manage impressions and relate to each other in cyberspace, the uses of language in online interaction, and how people coordinate work in virtual teams, as well as people's interface and information needs. Possible career paths include information systems designer, research analyst, user interface designer, software designer, usability

specialist, technology writer, and business, legal, and other graduate study.

4. *Communication and social influence (CSI)*: Students focusing in CSI will use communication principles to analyze issues and situations involving groups, organizations, and selected audiences to design, implement, and evaluate appropriate communication programs. Courses stress the positive, ethical, and effective uses of communication in human affairs. This focus area would be appropriate for students interested in using communication to bring about change at the individual and societal level. Possible career paths include public relations, marketing communications, polling, human resources, governmental affairs, and business, legal, and other graduate study.

Detailed information on the distribution of courses is available from the department.

In designing the communication major, the faculty of the department has considered students' need to understand contemporary research-based knowledge about communication as well as their need to be competent communicators in the workplace and in society at large.

Through the Department of Communication, CALS students may **complete a minor program of study in communication or a minor program of study in information science or both.**

The **minor in communication** consists of four required courses: COMM 1101, 1300, 2010 and either 2200, 2450, 2760, or 2850; Students also complete three elective courses totaling 9 credit hours, at least two of which must be at the 3000-4000 level, excluding the advanced writing and presentation courses and COMM 3030, 3530, 4050, 4960, and 4980.

The minor in information science is a cross-disciplinary program requiring one prerequisite statistics course, two courses from the information systems component area (primarily computer science), two courses from the human-centered systems component area (human-computer interaction and cognitive science), one course from the social systems component area (social, economic, political, and legal issues), and one additional course from any component area. A list of specific courses is available through the Department of Communication.

Students should contact the Department of Communication to enroll in either of these programs of study.

Crop and Soil Sciences

The Department of Crop and Soil Sciences provides instruction in the subject matter areas of crop science, soil science, environmental information science, and agronomy. Agronomy integrates the first three subjects and is a part of the Agricultural Sciences major (crop production and management concentration). A specialization in crop science is a part of the plant science major. A focus on soil science is possible in two majors, the Science of Natural and Environmental systems (SNES) or the Science of Earth Systems (SES). The Agricultural Sciences major is an interdisciplinary program for students wishing to pursue a general education in agriculture to prepare for careers

that require a scientific and integrative understanding of agriculture and food systems. Students can concentrate in one or more areas, including Animal Science, Agriculture Economics and Management, Education and Communication, Crop Production and Management, and Sustainable Agriculture. The SNES major is a biophysical science-based major that addresses the interface of environmental science and human systems involved in environmental management. Within the SNES major, students can concentrate in environmental agriculture, environmental biology, environmental economics, environmental information science, and sustainable development. The SES major places emphasis on the basic disciplines of chemistry, physics, and mathematics.

A minor in crop management is also available for students with any major at Cornell University. In summary, it requires at least two courses and at least 7 credits in each of crop science (CSS 2110 or 4050, 3170, or 4140) and plant protection (CSS 3150, 4440, ENTOM 2410, or PLPA 3010) plus at least three courses and at least 12 credits in soil science (CSS 2600, 3210, 3650, 3720, 4120, or 4660). Equivalent transferred courses can be substituted. This minor helps prepare students for the Certified Crop Advisor examination, which provides an important credential for jobs in agriculture and environmental management.

A minor in soil science requires 15 credits in soil science, but an additional 12 credits in biological, physical, and earth sciences are recommended to qualify the student for the Civil Service classification as Soil Scientist (GS-0470). In addition to 15 credits in soil science, Civil Service classification as Soil Conservationist (GS-0457) requires 12 credits in natural resources and agriculture and 3 credits in applied plant science. The soil science minor is also available to students with any major at Cornell University and transfer credit can be used to meet requirements. Students wishing to pursue either the crop management or soil science minor should contact the Department of Crop and Soil Sciences (255-5459).

Development Sociology

Technological, economic, demographic, and environmental changes are social processes. Each has major impacts on individuals, social groups, societies, and the international order. At Cornell, development sociology students study these and other facets of social change in both domestic and international settings. The development sociology major provides an opportunity for in-depth study of the interactions among development processes, environmental and technological contexts, demographic structures and processes, and the institutionalized and grassroots social movements through which people seek change in these dimensions. Courses offered by the department cover topics such as the impact of changes in agricultural systems on rural development and rural labor markets; community and regional development; environmental sociology; technology; the political economy of globalization; women in development; and ethnic stratification and integration. Most courses provide background in both domestic and international aspects of the subject matter. Students can develop a specialization with a domestic, international,

or global emphasis by choosing appropriate elective courses. All students learn the theory and methodology of sociology and how to apply both to research and policy in their subject areas.

Majors in development sociology are required to successfully complete seven core courses: introductory sociology (DSOC 1101), international development (DSOC 2050), population dynamics (DSOC 2010), methods (DSOC 3130 or 3140), theory (DSOC 3010), social stratification (DSOC 3700), and a course in statistics. Four additional development sociology courses are also required of all majors, at least two of which must be at the 3000 level or higher. The elective courses allow students to focus their major on particular themes such as the sociology of development; the social processes linking the environment, population, and development; and more general areas such as ethnic and class stratification, social movements, social policy, and gender and development. In each of these focus areas, students can choose to concentrate on domestic or international situations. Students are encouraged to complement courses in the department with course work in the history and economics of development, area studies, and the policy sciences.

Recognizing that students are concerned with future career opportunities, the development sociology major emphasizes acquisition of skills as well as general knowledge in preparation for jobs or post-graduate study. Accordingly, students are expected to become involved in the application of theory, methodology, and principles and concepts in the analysis of practical problems. Development sociology offers degree programs at both the undergraduate and graduate levels (B.S., M.S., and Ph.D.). The department and graduate field are recognized as top programs in the area. The department is particularly well known for providing instruction in international as well as domestic aspects of community and rural development, environmental sociology, sociology of agriculture, population studies, and the interactions among these dimensions. Development sociology faculty are committed to both quality instruction and cutting-edge research programs.

The department offers a general DSOC minor and a minor in Globalization, Ethnicity, and Development. For a complete list of requirements for either minor, please go to our web site: <http://devsoc.cals.cornell.edu> or visit 133 Warren Hall.

The department maintains strong ties with technical fields in CALS as well as with programs dealing with a range of issues of importance to international and domestic development. These include the International Agriculture Program, the Biology and Society Program, the Cornell Institute for Social and Economic Research, the Center for the Environment, the Polson Institute for Global Development, the Community and Rural Development Institute, the Gender and Global Change Program, the Bronfenbrenner Life Course Institute, and the Center for International Studies. Nearly half of the department faculty is associated with one or more area and ethnic studies programs including the American Indian Program, Latino Studies Program, Asian American

Studies Program, Southeast Asia Program, South Asia Program, Latin American Studies Program, East Asia Program, and the Institute for African Development. Department members also maintain working relations with faculty members in the Department of Sociology and social science units located in other colleges at Cornell. Students are encouraged to supplement their development sociology course work by electing courses in these other departments.

Education

The Department of Education builds on strong academic disciplines such as sociology, psychology, anthropology, biological and political sciences, political thought, and philosophy and is grounded in empirical and theoretical studies of educational practice in order to address education in diverse contexts and across the life span. The department has two foci to meet societal demands for teachers, researchers, and learners. The Learning, Teaching, and Social Policy (LTSP) concentration, which includes the Cornell Teacher Education Program (CTE), concentrates on teacher education in science, mathematics and agricultural science education, diversity, critical pedagogy, the study of school-age children and their families, and policy related to formal education. The Adult and Extension Education (AEE) concentration prepares scholars and practitioners for adult and extension education leadership and professional development roles in domestic and international community-based, nonformal, and formal organizations and focuses on community development and organizing, adult education, public scholarship, university extension/outreach, learning in adulthood, educational planning and program development, and international adult and extension education. These two programs of study, largely at the graduate level, prepare leaders who will both engage in professional practice and improve educational processes through their scholarship and practice. Our undergraduate program leads to initial certification in agricultural science education. An undergraduate minor in education is also available for students across all colleges at Cornell. For the latest information on program developments, go to education.cornell.edu.

Adult and Extension Education (AEE).

Creating a livable world requires more than just new knowledge and technology; it also requires sustained and expert practice in learning and education. The AEE program provides opportunities for graduate students to investigate participatory educational and organizing practices that link learning to the challenge of facilitating global sustainability. As public universities focus their research, teaching, and extension on domestic and global environmental, political, and social problems, the AEE program focuses on creating opportunities for critical reflection on adult, extension, and international education by connecting action and research. We seek to move beyond procedural questions of "how to do it" to critical institutional questions of who does and who should benefit from our adult, extension, and international educational work. The aim is to engage practitioners and graduate students in

critical reflection on practice to create practical theory from and for action.

Participation in the AEE program helps scholars and practitioners prepare for adult and extension educational leadership and professional roles in domestic and international community-based, nongovernmental, and governmental organizational settings. Areas of expertise and inquiry include participatory practices in research, community development, and adult education; public scholarship, university extension/outreach, and community organizing in the United States; international adult and extension education; learning in adulthood; educational planning and program development; continuing professional education; staff development; and health issues related to the education of adults.

Learning, Teaching, and Social Policy (LTSP). This program is designed to foster the development of educational leaders, researchers, and practitioners who approach issues and challenges in education from multiple perspectives, and seek to construct an integrated knowledge base upon which the practice of teaching, learning, and social policy is based. The impacts of implementation and practice are explored for creating new theories, approaches, and policies to improve teaching, learning, and community life.

Drawing on the dynamic nature of teaching and learning, this program challenges students to create and apply research-based, critically reflective analysis of cognitive, intellectual, personal, social, moral, and institutional dimensions of learning, teaching, and educational policy in a variety of contexts and at multiple governance levels. Students engage in critically reflective practice to address pressing problems and issues in formal and nonformal educational contexts across a variety of national and cultural settings.

The program is philosophically grounded in the perspective that learning and teaching is a lifelong process vital to individual development, the development of democratic communities, and the implementation of democratic values in educational policy and practice. Context, gender, and social and economic diversity underlie the design and implementation of curriculum, teaching and learning theory, and social interactions and are lenses for examining educational practice, theory, and policy.

Faculty members and graduate students in research programs in Learning, Teaching, and Social Policy (LTSP) engage in research that investigates factors that contribute to scientific and quantitative literacy; curriculum design and evaluation in science, mathematics, and agricultural science; effectiveness of teacher professional development; educational policy in rural schools; and sociomoral development, action, and reflective thought in schools and communities. Our mission is to contribute to an educated, global society of leaders and citizens who are prepared to respond to emerging social, technological, and scientific issues, with ethical and critically reflective judgment.

The Cornell Teacher Education (CTE) program is a unique interdisciplinary cohort-based program that certifies teachers for secondary teaching in agricultural science,

science, and mathematics. Students in the CTE program develop a solid mastery of their content areas and an understanding of the issues in education, and interact with and learn from each other. Undergraduates accepted into the CTE program major in a mathematics, agriculture, or science field in any Cornell college and complete a minor in education. With a CTE minor and a bachelor's degree, students can complete the Master of Arts in Teaching (MAT) in one year. CTE teachers are prepared as scholars of teaching and learning, able to help all their students achieve the scientific and quantitative literacy and ethical decision making skills needed for participation in a democracy.

Agricultural Science Education is taught at the middle and high school levels in New York State and nationally. Building on strong academic disciplines in the agricultural sciences, and with a solid grounding in the psychological, social, empirical, and theoretical bases of educational practice, the department offers two programs that lead to professional certification in Agricultural Science Education. The undergraduate degree in Agricultural Science Education and the agriculture option in the Master of Arts in Teaching are both offered under the Cornell Teacher Education umbrella. In addition, the undergraduate degree offers a non-certification option for persons with interests in instruction in nonschool settings such as extension, 4-H, arboretums, and state and national parks. All three of these programs prepare educators for leadership and professional roles in the broad fields of agriculture and natural resources.

Minor in Education

The minor in education gives students a planned core of courses to provide them with an overview of education as a field. One option prepares students to move into the graduate segment of the Cornell Teacher Education (CTE) program. Other options provide preparation for admission into other graduate teacher certification programs or a background for professional venues such as extension, business, and industry. Any undergraduate student in the university may enroll subject to availability in courses required for the minor. Students who wish to pursue a minor in Education must complete and submit an application. Applications are available in 426 Kennedy Hall, the CALS Office of Academic Programs, or by e-mailing cu_teacher_ed@cornell.edu.

Effective College Teaching Series. The Center for Learning and Teaching, under the auspices of the Department of Education, offers a series of courses, both credit and noncredit, for the improvement of teaching at Cornell, designed for Cornell faculty members and graduate students who are either currently teaching or intending to teach. For details, contact the Center for Learning and Teaching, 255-6130, or www.clt.cornell.edu.

Current offerings include:

EDUC 5480 Effective College Teaching
Spring and one-week summer session. 1-3 credits. For faculty and graduate students who intend to pursue an academic career.

EDUC 5780 ITADP Cross-Cultural Classroom Dynamics, Language, and Teaching Practicum

Fall and spring. 2 credits. For international graduate students who have, or will have, teaching assistantships.

EDUC 5790 ITADP Further Training for International Teaching Assistants

Fall and spring. Noncredit course for international teaching assistants who have completed EDUC 5780 but need or desire continued work in classroom instructional and communication skills.

Graduate Teaching Development Workshops

Offered early in each fall and spring semester, this daylong series offers an array of workshops in teaching effectiveness, from teacher-student interactions to developing a teaching portfolio. Noncredit, open to all Cornell faculty members and graduate teaching assistants.

EDUC 6200 Internship in Education

Fall and spring. 1 credit. Prerequisite: CALS Graduate Student Professional Development Workshop. For CALS graduate teaching assistants or CALS teaching personnel who wish to extend their workshop experience through reflective practice and consultation with an instructional support specialist.

Entomology

The entomology curriculum provides students with a basic background in biological and natural sciences, with a special emphasis on the study of insects. Majors may pursue graduate studies in entomology or related sciences upon completion of the B.S. degree. Alternatively, students may immediately begin careers in various aspects of basic or applied insect biology, including integrated pest management, insect pathology, environmental assessment, medical or veterinary entomology, insect toxicology, apiculture, insect systematics, or insect ecology. Because of the diversity of career options, the major includes flexibility among the core requirements and electives that can be selected by students in consultation with their advisors.

Requirements

General Requirements for CALS (see Graduation Requirements for Bachelor of Science) Basic Science and Math Requirements

- One year of college mathematics, may substitute statistics or biometry
- One semester of physics (may need two depending on future plans)
- CHEM 1570 Introduction to Organic and Biological Chemistry or CHEM 3570 and 3580 Organic Chemistry for the Life Sciences (for students planning on medical school)
- Introductory biology (1101-1104 recommended, even if AP credit received)
- BIOGD 2810 (genetics)
- BIOEE 2780 (Evolutionary Biology)
- Choose one of the following two courses:
BIOEE 2610 (Ecology and the Environment)
BIOBM 3300, 3310, or 3320 (Principles of Biochemistry)

(Choice depends on student interest in organismal vs. cellular/molecular aspects of biology)

Entomology Requirements (15-21 credits)

- ENTOM 2120 Insect Biology—4 cr
- Group A (core courses). Choose two of the following six courses:
ENTOM 3310/3311 Insect Systematics—4 cr
ENTOM 3330 Larval Insect Biology—3 cr
ENTOM 3520/3521 Medical and Veterinary Entomology—4 cr
ENTOM 4440 Integrated Pest Management—4 cr
ENTOM 4550 Insect Ecology—4 cr
ENTOM 4630 Invertebrate Pathology—4 cr
ENTOM 4830 Insect Physiology—4 cr
- Two additional entomology courses from Groups A or B (see link to Entomology Course Spreadsheet for a complete list of entomology courses, www.entomology.cornell.edu)

Food Science

The food science program prepares students for careers in the food industry or research organizations and for graduate study in food science or related disciplines. Food scientists enjoy satisfying careers that help ensure the sustainable availability of a safe, nutritious, affordable, and high-quality food supply for people throughout New York State, the nation, and the world.

Students in the food science program can choose from one of three specialization options in the major: (1) food science; (2) food operations and management; or (3) food biotechnology. The first option meets the curriculum standards set by the Institute of Food Technologists (IFT), the premier professional society for food scientists, allowing students to compete for IFT scholarships and awards. Students choose an option based on their individual interests and career goals.

The first two years of the undergraduate food science program are intended to establish a solid background in the physical and biological sciences, math and statistics, and communication skills. Required courses include chemistry (introductory and organic), biology, microbiology, calculus, physics, first-year seminar, introductory food science courses, and nutrition. The last two years emphasize the application of these basic sciences and technology to the manufacturing, sensory evaluation, storage, distribution, and safety of foods and food ingredients. Examples of food science core courses include Food Engineering Principles, Physical Principles of Food Manufacturing, Food Safety Assurance, Food Chemistry, Sensory Evaluation of Foods, and Food Microbiology; many elective courses are offered as well. Students choose electives to satisfy both college distribution requirements and their individual interests within the major and beyond.

Students are also strongly encouraged to participate in undergraduate research supervised by a faculty member and/or complete an internship in a food company during their program of study. Most teaching

faculty in the department also have active research programs and welcome participation by undergraduate students. Students may receive academic credit or wages for faculty-directed undergraduate research. Several food companies recruit on campus for their internship programs. These internships provide an excellent opportunity for students to gain hands-on experience in their chosen field of interest and to establish contacts for future employment. A modern food processing and development pilot plant, an operational dairy plant, and well-equipped laboratory facilities are available to support the teaching and research needs of undergraduates.

Information Science

Information Science (IS) is an interdisciplinary field that studies the design and use of information systems in a social context: the field studies the creation, representation, organization, application, and analysis of information in digital form. The focus of Information Science is on systems and their use, rather than on the computing and communication technologies that underlie and sustain them. Moreover, Information Science examines the social, cultural, economic, historical, legal, and political contexts in which information systems are employed, both to inform the design of such systems and to understand their impact on individuals, social groups, and institutions.

The Information Science major organizes its courses into three area-based tracks:

- *Human-Centered Systems.* This area examines the relationship between humans and information, drawing from human-computer interaction and cognitive science.
- *Information Systems.* This area examines the computer science problems of representing, organizing, storing, manipulating, and accessing digital information.
- *Social Systems.* This area studies the cultural, economic, historical, legal, political, and social contexts in which digital information is a major factor.

Students must complete a set of 11 core courses: one introductory course, four courses in math and statistics, and two courses from each of the three IS areas. Students must also obtain depth in two tracks—a primary and a secondary track—that together best represent their interests. In particular, completion of the major requires four advanced courses from the selected primary track and three advanced courses from the secondary track.

Note: All INFO courses will count as in-college credit.

Requirements

Core (11 courses)

1. Introductory (one course):

INFO 1300 Introductory Design and Programming for the Web

Note: INFO 1301 and 1302 (no longer offered) may count together in place of 1300.

2. Math and Statistics (four courses):

- MATH 1110 Calculus I
- one course chosen from: MATH 1710 Statistical Theory and Application in the Real World; HADM 2201 Hospitality Quantitative Analysis; AEM 2100 Introductory Statistics; PAM 2100 Introduction to Statistics; ENGRD 2700 Basic Engineering Probability and Statistics; BTRY 3010 Statistical Methods I; SOC 3010 Evaluating Statistical Evidence; CEE 3040 Uncertainty Analysis in Engineering; ILRST 3120 Applied Regression Methods; ECON 3190 Introduction to Statistics and Probability; PSYCH 3500 Statistics and Research Design
- either MATH 2310 Linear Algebra with Applications or MATH 2210 Linear Algebra
- INFO 2950 Mathematical Methods for Information Science or CS 2800 Discrete Structures

3. Human-Centered Systems (two courses):

INFO 2140 Cognitive Psychology

INFO 2450 Communication and Technology

4. Information Systems (two courses):

CS 2110 Object-Oriented Programming and Data Structures*

INFO 2300 Intermediate Design and Programming for the Web

*CS 2110 is an intermediate programming course that requires prior knowledge of Java. Students who have not learned Java can take CS 1130 after completing INFO 1300 and 2300, or they can take CS 1110.

5. Social Systems (two courses):

- either ECON 3010 Microeconomics or ECON 3130 Intermediate Microeconomic Theory
- one course chosen from: INFO 2921 Inventing an Information Society; INFO 3551 Computers: From the 17th Century to the Dotcom Boom; or INFO 3561 Computing Cultures; or INFO 3200 New Media and Society

Where options in the core courses exist, the choice will depend on the student's interests and planned advanced courses for the selected primary and secondary tracks.

Tracks

Students must complete four advanced courses in their selected primary track and three advanced courses in their selected secondary track.

Courses taken to satisfy the core-course requirements may not be used to fulfill the track requirements.

All courses used toward the major must be taken for a letter grade. Students must earn a C- or better in all courses used for the major.

Additional information on Information Science courses can be found below and in the CIS section of *Courses of Study*. Course information for all other courses in the major can be found in the relevant departments (e.g., AEM, CS, and STS).

1. Human-Centered Systems

INFO 3400 Psychology of Social Computing

PSYCH 3420 Human Perception: Applications to Computer Graphics, Art, and Visual Display*

INFO 3450 Human-Computer Interaction Design

PSYCH 3470 Psychology of Visual Communications

INFO 3650 Technology and Collaboration

PSYCH 3800 Social Cognition*

PSYCH 4160 Modeling Perception and Cognition

INFO 4400 Advanced Human-Computer Interaction Design

INFO 4450 Seminar in Computer-Mediated Communication

INFO 4500 Language and Technology

DEA 4700 Applied Ergonomic Methods

*Students who take PSYCH 3420 may also count its prerequisite, PSYCH 2050, toward the Human-Centered Systems primary/secondary track requirements. Similarly, students who take PSYCH 3800 may also count PSYCH 2800 toward the Human-Centered Systems primary/secondary track requirements. At most, one of PSYCH 2050 or 2800 can be counted toward the primary/secondary track requirements.

2. Information Systems

INFO 3300 Data-Driven Web Applications

CS 4450 Computer Networks

LING 4424 Computational Linguistics

INFO 4300 Information Retrieval

INFO 4302 Web Information Systems

CS 4320 Introduction to Database Systems

LING 4474 Introduction to Natural Language Processing

CS 4620 Introduction to Computer Graphics

CS 4700 Foundations of Artificial Intelligence

ORIE 4740 Statistical Data Mining I

CS 4780 Machine Learning

ORIE 4800 Information Technology

CS 5150 Software Engineering

INFO 5300 Architecture of Large-Scale Information Systems

CS 5430 System Security

CS 5780 Empirical Methods in Machine Learning and Data Mining

3. Social Systems

INFO 2040 Networks

SOC 3040 Social Networks and Social Processes

INFO 3200 New Media and Society*

AEM 3220 Internet Strategy

INFO 3490 Media Technologies

- INFO 3551 Computers: From the 17th Century to the Dotcom Boom
- INFO 3561 Computing Cultures
- INFO 3660 History and Theory of Digital Art
- ECON 3680 Game Theory*
- INFO 3871 The Automatic Lifestyle: Consumer Culture and Technology
- STS 4111 Knowledge, Technology, and Property
- ECON 4190 Economic Decisions Under Uncertainty
- INFO 4290 Copyright in the Digital Age
- INFO 4350 Seminar on Applications of Information Science
- ORIE 4350 Introduction to Game Theory*
- INFO 4144 Responsive Environments
- SOC 4150 Internet and Society*
- INFO 4470 Social and Economic Data
- ECON 4760 Decision Theory I
- ECON 4770 Decision Theory II
- HADM 4489 The Law of the Internet and E-Commerce
- INFO 4850 Computational Methods for Complex Networks
- INFO 5150 Culture, Law, and Politics of the Internet

*Only one of ORIE 4350 and ECON 3680 may be taken for IS credit. Only one of INFO 3200 and SOC 4150 may be taken for IS credit.

The Minor

A minor in Information Science is also available to students in AAP (Architecture and Planning students only), Arts and Sciences, CALS, Engineering, Hotel, Human Ecology, and ILR. The minor has been designed to ensure that students have substantial grounding in all three of the human-centered systems, information systems, and social systems areas. Detailed information about the minor can be found in the CIS section of *Courses of Study*. Students should visit www.infosci.cornell.edu/ugrad for the most up-to-date description of the concentration and its requirements.

International Agriculture and Rural Development

International agriculture and rural development provides students with an understanding of the special problems of applying basic knowledge to the processes of agricultural and rural development in low-income countries. The student chooses an area of concentration within the major and works with an advisor to plan an individualized program of study. Areas of concentration include (1) social development and livelihoods, (2) food systems, and (3) environment and ecosystems. The core curriculum and areas of concentration are designed to acquaint students with relevant socioeconomic factors, the physical and biological aspects of tropical crops and animal production, and issues of resource management and sustainability in low-income countries.

Requirements

In addition to the college distribution requirements, students in international agriculture and rural development must take a minimum of 50 credits toward the major. A minimum of 18 credits from a core curriculum (in addition to foreign language) are required, 8 of which should be in international agriculture and rural development (IARD). The foreign language requirement for the IARD major is identical to that of the College of Arts and Sciences (see p. 445). Other course work is drawn from a wide range of disciplines, consistent with the student's chosen concentration. Students are expected to complete an overseas field study experience of a minimum of six weeks. The objective is to familiarize students with the many facets of agricultural and rural development in low-income countries.

International Studies Minor

Preparing for leadership in an increasingly interconnected and dynamic world, CALS undergraduates need knowledge, skills, and attitudes that build "global competencies." The minor for CALS students not majoring in international agriculture and rural development will recognize an international concentration of course work and experiences.

Requirements

1. Five courses with significant international content, as recommended by students' major departments (three should be from CALS).

Highly recommended

1. Foreign language course work.
2. An approved overseas experience (exchange, study abroad program, internship, or faculty-led short course).

For more information, contact the academic programs coordinator in the CALS International Programs Office, 255-3811.

Landscape Architecture

Landscape architecture focuses on the art of landscape design as an expression of the cultural values and the natural processes of the ambient environment. The program's unique place within the university promotes interaction among the areas of horticulture, environmental science, architecture, and city and regional planning.

The course of study prepares students for the practice of landscape architecture. The curriculum focuses on graphic communication, basic and advanced design methods, landscape history and theory, plant materials, construction and engineering technology, and professional practice. Design studios deal with the integration of cultural and natural systems requirements as applied to specific sites at varying scales. Projects may include garden design, parks design, housing design, historic preservation, environmental rehabilitation, and urban design.

Landscape architecture offers two professional degree alternatives: a four-year bachelor of science degree administered through the College of Agriculture and Life Sciences and a three-year master of landscape architecture degree administered through the Graduate School for those who have a four-year undergraduate degree in another field. Both of these degrees are accredited by the

Landscape Architecture Accreditation Board (LAAB) of the American Society of Landscape Architects. The major in each degree is composed of core courses related to professional education in landscape architecture, a concentration in a subject related to the core courses, and free electives.

The department also offers a two-year master of landscape architecture advanced degree program administered through the Graduate School for those with accredited degrees in landscape architecture or architecture. The program entails core courses in the discipline and the development of a concentration in subject matter areas such as landscape history and theory, landscape ecology and urban horticulture, the cultural landscape, site/landscape and art, or urban design.

In addition, an undergraduate minor in cultural landscape studies is available for nonmajors.

Dual-Degree Options

Graduate students can earn a master of landscape architecture and a master of science (Horticulture) or a master of city and regional planning simultaneously. Students need to be accepted into both fields of study to engage in a dual-degree program and must fulfill requirements of both fields of study. Thesis requirements are generally integrated for dual degrees.

Study Abroad

The faculty encourages study abroad and has two formally structured programs. The *Denmark International Study* (DIS) program is available primarily to senior undergraduates and third-year graduate students in the fall semester and is administered through Cornell Abroad. The *Rome Program* is made available to undergraduates and graduate students through the College of Architecture, Art, and Planning.

Bachelor of Science Landscape

Architecture Degree Sequence (Note: Each semester, the studio classes require payment of a supply and field trip fee, and all landscape architecture majors are required to pay an annual technology fee.):

First Year

<i>Fall Semester</i>	<i>Credits</i>
*LA 1410 Grounding in Landscape Architecture	4
†Biological sciences elective	3
†Physical sciences elective	3
†Social sciences or humanities elective	3
†Written or oral expression elective	3
	<hr/> 16

Spring Semester

*LA 1420 Grounding in Landscape Architecture	4
†Biological sciences elective	3
†Social sciences or humanities elective	3
†Written or oral expression elective	3
‡Physical sciences elective	3
	<hr/> 16

Second Year

Fall Semester

*LA 4910 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment	4
*LA 2010 Medium of the Landscape	5
†Biological sciences elective	3
†Social sciences or humanities elective	3
Historical studies	3
	18

Spring Semester

*LA 2020 Medium of the Landscape	5
*LA 4910 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment	4
†Written or oral expression elective	3
†Physical sciences elective	3
Concentration	3
	18

Third Year

Fall Semester

*LA 3010 Integrating Theory and Practice	5
*LA 3150 Site Engineering	5
‡Free electives	4
	14

Spring Semester

**Concentration	6
*Historical studies	3
*LA 3180 Site Construction	5
Electives	2
	16

Fourth Year

Fall Semester

*LA 4010 Advanced Synthesis: Project Design	5
**Concentration	2
LA 4120 Professional Practice 1	
†Social sciences or humanities elective (Optional landscape architecture study abroad semester in Denmark or Rome)	3
	11

Spring Semester

*LA 4020 Integrating Theory and Practice II	5
**Concentration	4
‡Free elective	2
	11

Summary of credit requirements

*Specialization requirements	58
†Distribution electives	39
‡Free electives	8
**Concentration	15
	120

Master of Landscape Architecture (M.L.A.) License Qualifying Degree

Requirements of the three-year M.L.A. curriculum include 90 credits, six resident units of satisfactory completion of the core curriculum courses, and a thesis or a capstone studio. (Note: Each semester, the studio classes require payment of a supply and field trip fee, and all landscape architecture majors are required to pay an annual technology fee.)

First Year

Fall Semester

*LA 5050 Graphic Communication I	3
*LA 5010 Composition and Theory	5
*Historical studies	3
*LA 4910 Creating the Urban Eden: Woody Plant Selection, Design and Landscape Establishment	4
	15

Spring Semester

*LA 5020 Composition and Theory	5
*LA 4920 Creating the Urban Eden: Woody Plant Selection, Design and Landscape Establishment	4
LA 5900 Theoretical Foundations	2
Concentration	3
	14

Second Year

Fall Semester

*LA 6010 Integrating Theory and Practice	5
*LA 6160 Site Engineering	5
**Concentration	3
Historical studies	3
	16

Spring Semester

*LA 6020 Integrating Theory and Practice	5
*LA 6180 Site Construction	5
*LA 6900 Methods of Landscape Architectural Inquiry	3
**Historical studies	3
	16

Third Year

Fall Semester

*LA 7010 Urban Design and Planning	5
‡Free elective	3
**Concentration	3
Theory	3
LA 4120 Professional Practice 1	—
	15

Spring Semester

*LA 8000 Master's Thesis in Landscape Architecture	9
or *LA 7020 Advanced Design Studio	5
‡Free elective(s)	2 or 6
Concentration LA 6030	1
	14

Summary of credit requirements

*Specialization requirements	64 or 68
**Concentration	16
‡Free electives	6 or 10
	90

Master of Landscape Architecture Advanced Degree Program.

The two-year master of landscape architecture (M.L.A./A.D.) program serves to broaden and enrich undergraduate education in design by providing an expanded educational experience to those who are technically skilled. Applicants must hold a bachelor's degree in landscape architecture or architecture from an accredited program. The objective of the two-year (M.L.A./A.D.) program is to develop specializations for individuals who may wish to teach, practice, or conduct applied research in landscape architecture.

Students admitted to the two-year M.L.A./A.D. program are required to complete 60 credits of course work as approved by the members of their graduate committee. For landscape architects, this must include at least two advanced studios, a graduate seminar, a concentration, and a thesis. For architects, the curriculum requires three advanced studios, two courses in plants and planting design, two courses in the history of landscape, two courses in site engineering, a seminar in design theory, a course in professional practice, a concentration, and electives.

Undergraduate Minor for Nonmajors

Students outside the professional program may choose the undergraduate minor (five courses, 15 credits) in cultural landscape studies to complement their major. A variety of courses consider the cultural landscape as an object, something to be studied for its own sake, and as a subject, as a means to understand society's relationship to natural systems. The study of cultural landscapes also includes perceptions of landscapes, cultural ideas and values, and visible elements. Direct inquiries to Professor A. Hammer, Department of Landscape Architecture, 440 Kennedy Hall.

Courses: choose five for a total of 15 credits

- +LA 3600 Pre-Industrial Cities and Towns of North America (3 credits) offered alternate years
- +LA 2610 Fieldwork in Urban Archaeology (4 credits)
- +LA 2620 Laboratory in Landscape Archaeology (3 credits)
- +LA 2820 Photography and the American Landscape (3 credits)
- +LA 4180 Audio Documentary: Stories from the Land (3 credits)
- +LA 4830 Seminar in Landscape Studies (3 credits)
- LA 4970 Independent Study (1–5 credits)
- LANAR 5240 History of European Landscape Architecture (3 credits)
- LANAR 5250 History of American Landscape Architecture (3 credits)
- LA 5450 The Parks and Fora of Imperial Rome (3 credits)
- LA 7920 Landscape Preservation: Theory and Practice (3 credits)

+ Distribution elective

Natural Resources

Natural Resources is an interdisciplinary major focusing on the fundamental knowledge and analytical tools required to conserve, restore, and manage the Earth's biodiversity and ecosystem services in sustainable ways. The curriculum draws on relevant knowledge from biology, ecology, chemistry, mathematics, sociology, economics, law, and ethics. A large number of field courses provide direct experience working in forests, wetlands, streams, lakes, and policy-making arenas. Courses address pressing environmental issues such as global climate change, landscape transformation, endangered and invasive species, human alteration of biogeochemical cycles, "green" markets and other environmental strategies, environmental justice, bio-cultural and biological diversity, and international conservation. Concentrations include applied ecology, resource policy and management, and environmental studies.

The major allows students flexibility to pursue a variety of paths to understand the biological, ecological, ethical, and societal basis for biodiversity conservation, sound resource management, and sustainable development.

The Future for Natural Resources Majors

Most students entering the major have a strong interest in the natural world and in contributing to greater harmony between society and the environment. An undergraduate degree in natural resources gives students the concepts and tools needed to participate intelligently and effectively in decisions that determine the future of our environment, either as professionals within a diverse array of environmental careers, or as informed citizens working in other professions.

Graduates with a major in natural resources have the flexibility to pursue a number of different careers because of the interdisciplinary nature of the curriculum. The major prepares students for graduate school in numerous fields, and for entry-level positions in natural resources and environmental management agencies at local, state, federal, and international levels, or for jobs in the private for-profit (e.g., environmental consulting firms) or nonprofit (e.g., conservation organizations) sectors. Many students ultimately pursue graduate studies in environmentally related fields including the biological, physical, and chemical sciences; forest, wetland, stream, wildlife, or fisheries management; and environmental law and public policy. Graduates often assume leadership positions in government, colleges and universities, national and international conservation organizations, environmental consulting firms, environmental divisions of private industry, and organizations involved in environmental education or communication.

Curriculum

Natural resources is a flexible major, and free electives can account for as many as 40 credits out of the total of 120 required for graduation. Students complete a set of courses in biology, ecology, chemistry, mathematics, economics, ethics, and written and oral expression; many of these courses also meet the college's distribution requirements for graduation. *Freshmen and sophomores* complete a series of four foundation courses in the major: Introduction to the Field of Natural Resources, Environmental Conservation, Introductory

Field Biology, and Society and Natural Resources. Juniors complete three core courses: Applied Population Ecology, General Ecology, and Natural Resources Management and Planning. These foundation and core courses introduce the critical environmental and natural-resource issues confronting society, and develop the conceptual and methodological tools that students will use in upper-division courses.

Juniors and seniors may specialize in one of three areas of concentration: applied ecology, resource policy and management, or environmental studies. Through course work in these concentrations, students gain an in-depth understanding of key principles, concepts, and practices. All students also have the flexibility to gain exposure to a wide variety of environment-related courses offered by Natural Resources and other departments throughout Cornell. Many students elect to conduct a research honors thesis.

Areas of Concentration within the Major

Applied ecology is designed as a foundation for those who wish to pursue careers or advanced study in science-based conservation or management of fish and wildlife populations and their habitats, conservation biology, control of invasive and overabundant species, watershed and landscape management, quantitative population dynamics, resource inventory and information management, global ecology, or applied ecology and biogeochemistry of forests and wetlands. This concentration also may interest students seeking a biologically based approach to environmental science or global studies. Students who select this concentration typically focus their course work in the areas of species biology and applied ecosystem ecology, including quantitative analysis of fish, wildlife, and plant populations, ecosystems, and landscapes. They complement their course work within the department with courses in other departments, such as Ecology and Evolutionary Biology, Microbiology, Geology, Crop and Soil Science, Atmospheric and Earth Sciences, and Plant Biology.

Resource policy and management

provides a foundation for students who wish to pursue careers or advanced study in the social science or policy aspects of natural resource conservation and management, environmental sociology, international conservation, environmental law, environmental policy analysis, or environmental communication. Students who select this concentration typically focus on courses related to the development of environmental policy, management strategies for particular species or ecosystems, natural resource planning, resource economics, or programs in environmental communication and education. They complement their course work within the department with courses in other departments such as Government, Ecology and Evolutionary Biology, Development Sociology, Communication, Applied Economics and Management, City and Regional Planning, and Policy Analysis and Management.

Environmental studies is intended for those who wish to pursue a broad and synthetic approach to understanding and participating in (re)structuring the interactions between society and environment. The concentration's

emphasis is on developing an ability to think critically about these interactions. Building on a foundation of courses required for the natural resources major, during years 3 and 4, each student will design a cohesive sequence of six upper-division courses with help from their departmental advisor. These six courses should include two courses from each of three categories: (1) natural science; (2) social science and analytic skills, e.g., economics, political economy, logic, computer programming, GIS, statistics; and (3) humanities, e.g., history, philosophy, literature, arts, foreign language. This self-defined environmental theme ensures development of specific competencies linked to personal and professional ambitions of the individual student. Example themes include environmental law, environmental education, "green" business, sustainable agriculture, and environmental communication. Students are expected to take advantage of internship, independent study, and honors thesis opportunities, as appropriate.

Research and Work Opportunities for Undergraduates

The department offers many opportunities for field-oriented studies, independent research, internships, and jobs. These include several field-based courses and access for research at the Arnot Teaching and Research Forest near Ithaca, the Little Moose Field Station in the Adirondacks, the Cornell Biological Field Station on Oneida Lake near Syracuse, and the Hubbard Brook Experimental Forest in New Hampshire, as well as numerous natural areas near campus. Part-time jobs in the research and extension programs of many faculty members offer students opportunities for career-related work experience. A research honors program is available for qualified students.

For a comparison of the natural resources major with other environmental majors, see www.dnr.cornell.edu/teaching/ugrad/faq/cals_env.pdf.

Nutritional Sciences

Nutritional sciences draws upon chemistry, biology, and the social sciences to understand complex relationships among human health and well-being, food and lifestyle patterns, food and agricultural systems, and social and institutional environments.

The program in nutritional sciences provides students with strong training in human nutrition in the context of an understanding and appreciation of the agricultural and life sciences. The program responds to the growing and important interrelationships among human nutrition and the agricultural and life sciences. Growing public interest in health and nutrition has placed new demands upon food producers, processors, and retailers. The problems of hunger and malnutrition in the United States and abroad require that nutritionists work with specialists in areas such as agricultural economics, food production, and development sociology. Advances in biotechnology provide researchers with new ways to understand human nutritional requirements and the regulation of human metabolism.

Nutritional sciences majors complete a core set of requirements and choose elective courses in the areas of their particular interest. The core curriculum includes

introductory chemistry and biology, organic chemistry, biochemistry, physiology, and mathematics. Students complete five courses in nutritional sciences: NS 1150 Nutrition, Health, and Society; NS 2450 Social Science Perspectives on Food and Nutrition; NS 3450 Introduction to Physicochemical and Biological Aspects of Foods; NS 3310 Physiological and Biochemical Bases of Nutrition; and NS 3320 Methods in Nutritional Sciences. In addition, students select a minimum of three advanced courses in nutritional sciences as well as elective courses in the broad areas of food production and processing, food and agricultural policy, the life sciences, environment and natural resources, communication, and education.

All majors have faculty advisors in the Division of Nutritional Sciences with whom they meet regularly. Advisors help students plan course schedules and help find opportunities for special study or experiences outside the classroom.

Many students engage in laboratory or field research with a faculty member for academic credit. The research honors program is designed for academically talented students who are interested in research. Honors students conduct independent research projects under the guidance of a faculty member and prepare an honors thesis. Many students participate in field experiences for credit during the academic year or summer. Placements in laboratories, industries, or community agencies are possible.

The major in nutritional sciences can lead to many different career paths. By supplementing the core requirements with courses in different areas, students can prepare for jobs in industry, government, or community agencies in the United States or abroad. The major is excellent preparation for graduate study in a variety of fields.

The Division of Nutritional Sciences is affiliated with both the College of Agriculture and Life Sciences and the College of Human Ecology. Most of the division faculty members work in Savage Hall, Kinzelberg Hall, and Martha Van Rensselaer (MVR) Hall. In addition to housing offices, classrooms, and seminar rooms, these buildings contain research facilities, specialized laboratories, a human metabolic research unit, and computer facilities.

For additional information about the nutritional sciences program, contact the Division of Nutritional Sciences Academic Affairs Office, B21 Savage Hall, 255-4410, aadns@cornell.edu.

The minor in **nutrition and health** in the College of Agriculture and Life Sciences allows students to choose from courses concerned with economic influences on human nutrition, epidemiology and public health, food quality and food service management, human health and nutrition, nutritional biochemistry, and the psychological and social influences on human nutrition. The minor consists of NS 1150 Nutrition, Health, and Society plus 9 credits of 2000-level or above didactic NS courses. Several NS courses are excluded from use toward the minor. Please check www.nutrition.cornell.edu/undergrad/calsminr.html for details. Enrollment is limited in some courses.

Plant Sciences

Plant sciences prepares students for careers that meet the challenges of providing a safe, nutritious, and abundant food supply for a growing world population and using plants to enhance the beauty of our landscapes. It is a multidisciplinary program administered by faculty in the Departments of Crop and Soil Sciences, Horticulture, Plant Biology, Plant Breeding and Genetics, and Plant Pathology and Plant-Microbe Biology, representing one of the strongest groups of plant scientists in the world. Students in the program share a common interest in learning about topics associated with plant growth and development in the broadest sense, but beyond that common thread, individual career goals vary widely. Some have their sights set on careers in applied agriculture, others plan to contribute to advancements of our knowledge by way of teaching or research, and still others see study in plant science as a stepping-stone to specialized training in business, government, or law. In addition to the college distribution requirements, Plant Science majors must take at least one course in each of several areas, including botany, plant physiology, ecology, taxonomy/systematics, genetics, statistics, plant-pest interactions, crop production, and soil science, for a total of 40 credits.

Students who begin with well-defined interests or who identify certain areas of interest after several semesters of course work may choose a specialization within one of the five cooperating departments. Each specialization has additional requirements beyond the basic core courses. However, students who are uncertain about the breadth of their interests or who are seeking as much flexibility as possible may choose to design their course of study in plant sciences without declaring a specialization. Those students develop a strong background in plant science but have fewer required courses so that they can explore other areas of interest.

More than 140 courses that deal directly with some area of plant science are offered by the cooperating departments, and other courses relating to plant science are offered elsewhere in the university. There are also ample opportunities for internships, undergraduate teaching, and research experience. Qualified students, especially those expecting to go on for graduate degrees, are encouraged to avail themselves of such opportunities. Students who are planning to enter the workforce immediately upon completion of the B.S. degree are encouraged to obtain practical experience. This may involve summer employment in research or in a plant production or maintenance-related industry such as a lawn and tree care company, commercial greenhouse, nursery, orchard, vineyard or winery, botanical garden or arboretum, crop production farm, or with Cooperative Extension. Plant sciences faculty members also encourage students to avail themselves of opportunities to work and/or study abroad.

In addition to classrooms and laboratories in five buildings on the Cornell campus proper, research and teaching facilities adjacent to the campus are freely available to students for hands-on practice, technical training, independent research projects, and internships. These facilities include research

orchards and vineyards, golf courses and a turf research facility, the Cornell Plantations (including arboretum and natural areas), and vegetable and field crop farms. Demonstration/research facilities in Aurora (Cayuga County), Geneva (Ontario County), Highland (Ulster County), Lake Placid (Essex County), Middletown (Orange County), Odessa (Tioga County), and Riverhead (Suffolk County) are also sites administered by departments in the Plant Sciences consortium and are available for undergraduate and graduate field study.

For more information about this major, see www.cals.cornell.edu/cals/hort/teaching/plant-sci-undergrad/index.cfm

Crop science is a specialization that focuses on the major food and feed crops of the world, such as wheat, corn, rice, soybeans, and alfalfa. In addition to 15 credits in applied crop science, students in this program take at least 6 credits in plant protection (weed science, entomology, and plant pathology) and at least 6 credits in soil science. The crop science specialization can be focused on preparation for graduate school or be combined with a crop management minor for those planning to be certified crop advisors.

Horticulture. Derived from the Latin word "hortus," meaning garden, horticulture is a blend of science and culture involving knowledge of plants grown in farms and gardens, parks and landscapes, and athletic and recreational facilities; indoor plants; greenhouse and nursery plant production; and crops used for wines, herbs and spices, medicinal purposes, and coffee and teas. The knowledge and skills essential to grow, maintain, process, and market horticultural plants are in high demand in a world increasingly concerned with environmental quality, recreation, and health.

The 40 faculty members in horticulture specialize in almost every aspect of horticultural science, with active research and outreach programs regionally, nationally, and internationally.

Students choosing a concentration in horticulture must complete a minimum of 40 credits of core courses for the plant sciences major, plus the following courses:

HORT 1101 Horticultural Science and Systems (4 credits)

HORT 4000 Plant Propagation (3 credits)

Two HORT courses in plant production or management at the 4000 level (6 credits)

One additional course of integrated pest management (plant pathology, entomology, or weed science) beyond the 3-credit plant sciences core requirement (3 credits)

Students transferring into Cornell from other colleges can petition to waive or adjust these requirements, in consultation with their faculty advisors.

Plant biology stresses a basic, rather than applied, understanding of how plants function, grow, and develop, as well as a study of their genome, evolution, and relationships to humans. It provides undergraduates with a thorough preparation for graduate study in plant sciences. In cooperation with an advisor each student plans a curriculum with a concentration in basic sciences, supplemented by more advanced courses in plant biology. Students

specializing in plant biology within the plant sciences major should take a minimum of four courses beyond the core of plant sciences courses. Options include plant molecular biology, plant cell biology, biochemistry, ethnobotany, and further courses in the function, growth, genetics, systematics, ecology, and evolution of plants. Individual research under professorial guidance is encouraged. Different options within plant biology afford a flexible curriculum.

Plant breeding and genetics relates information about genetics/genomics of plants to the improvement of cultivated plant species. Agriculturally important genes are identified, characterized, and deployed through combinations of molecular studies and sexual crosses. This area of study integrates genetic information with plant physiology/biochemistry, plant pathology, entomology, conservation biology, international agriculture, and related areas to create crops that meet the needs of modern society. In addition to the core plant sciences courses, students should take PLBR 2010, 4030, 4040, and BIOPL 3430. Other courses may be included after consultation with the advisor. Students are encouraged to participate in research projects and take advantage of opportunities for internships in industry.

Plant pathology and plant-microbe biology faculty study interactions of plants with pathogenic and beneficial microorganisms and with toxic elements in air and water. Some specialists in the field choose to focus their attention on the cause and management of plant diseases and others employ contemporary tools of molecular biology to answer fundamental questions about the nature of host-pathogen interactions. Working together, they advance the frontiers of science to ensure rapid deployment of new strategies for growing healthy crops with maximum yields and minimal impacts on the surrounding environment. For most students, a concentration in Plant Pathology and Plant-Microbe Biology is preparation for graduate study in the field. However, graduates may also be employed as sales or technical representatives with agribusiness firms, Cooperative Extension educators, state or federal regulatory officials, and laboratory technicians. Suggested courses beyond the Plant Science core include organic chemistry, biochemistry, calculus, introductory plant pathology, mycology, entomology, and plant breeding.

Plant protection is offered to students who are interested in the management of plant pests. It includes the study of insects, diseases, weeds, vertebrate pests, and other factors that prevent maximum crop production. Although designed as a terminal program for students desiring practical preparation for careers in pest management, the specialization can also provide an adequate background for graduate work in entomology, plant pathology, or weed science.

Science of Earth Systems (SES)

The EARTH SCIENCES have never been more critical to society than they are today. Global warming, dwindling energy resources, inadequate water supplies, political strife over

strategic minerals, and megadisasters threatened by volcanic eruptions, earthquakes, tsunamis, and hurricanes: these are but a few of the headlines that appear with increasing frequency. The Department of Earth and Atmospheric Sciences at Cornell is a global leader in research directed toward understanding the fundamental processes that have shaped our planet, and is committed to providing Cornell students with the earth literacy needed to serve as informed citizens and wise stewards of the Earth. EAS faculty members and graduate students carry out frontier research on both basic and applied aspects of subjects as diverse as satellite monitoring of volcanic activity, the deep structure of the Andes and Tibetan Plateau, the nature of the earth's ionosphere, and the impact of aerosols on global climate.

The Science of Earth Systems (SES) major is the undergraduate program offered by EAS to Cornell students in the Colleges of Engineering, Arts and Sciences, and Agriculture and Life Sciences. Students in this program can pursue education and research that prepares them to compete for careers or graduate study at leading institutions in this country and abroad. Students may choose to focus on one of a number of disciplinary specialties, such as geophysics or tectonics, or develop the broad expertise needed to understand the interactions between the diverse elements of Earth and life in the past, present, and future. By analyzing the complex relations among the ocean, solid earth, atmosphere, and biosphere, students can help meet society's growing demand for energy, minerals, and clean water as well as contribute to mitigating the negative impacts related to global warming, rising sea level, natural hazards, and decreasing biodiversity.

The SES program is intrinsically interdisciplinary, involving many branches of science and engineering. Examples include archaeology, astronomy, biological and environmental engineering, civil and environmental engineering, and ecology and evolutionary biology. The SES program is unique in that it incorporates the fundamentals of earth science with the emergence of a new and more complete approach that encompasses all components of the earth system—air, life, rock, and water—to gain a new and more comprehensive understanding of the world as we know it.

To achieve a complete understanding of these important issues, students must have a desire to take a very hands-on approach. An abundance of opportunities exist for geological, oceanographic, and meteorological research in the field and for nationwide and international travel as well as paid research experience. Students have worked with faculty members in the Andes, the Aleutians, the Rockies, the Atacama Desert, the Caribbean, Tibet, and Hawaii, and have spent a semester at sea in the Woods Hole Ocean Studies Program. Students are also able to probe the ionosphere of Earth and the surface of Mars by utilizing techniques in remote sensing.

The SES major provides a strong preparation for graduate school in any one of the earth sciences, such as atmospheric sciences, geological sciences, geophysics, geochemistry, oceanography, hydrology, and biogeochemistry. Students seeking employment with the B.S. degree will have

many options in a wide variety of careers related to energy, the environment, and critical resources in both the private sector and government. Students with strong science background provided by the SES major are also highly valued by graduate programs in environmental law, public affairs, economics, and public policy.

Requirements for the Major

1. Basic Math and Sciences

This part of the SES curriculum builds a strong and diverse knowledge of fundamental science and mathematics, providing the student with the basic tools needed in upper-level science classes.

- MATH 1910–1920 (or MATH 1110–1120)
- PHYS 2207–2208 (or PHYS 1112–2213)
- CHEM 2070–2080 or 2070–1570 or 2090–2080
- BIOLOGY—there are three options (CALS students must choose within option 1):

- one year of biology, choosing from the introductory biology sequences of courses: BIOG 1101/1103–1102/1104, or 1105/1106, or BIOG 1109/1110
- one semester from the introductory biology sequences of courses (listed in option 1) and EAS/BIOEE 1540 or EAS 1700
- students may substitute (with written permission of their advisor) one semester of biology with an additional semester of chemistry, math, or physics.

- Required Introductory Course: EAS 2200 The Earth System
- Science of Earth Systems Core Courses

These courses are founded on the most modern views of the planet as an interactive and ever-changing system, and each crosses the traditional boundaries of disciplinary science. Three courses selected from the following four core courses are required for the major.

- EAS 3010 Evolution of the Earth System
- EAS/NTRES 3030 Biogeochemistry
- EAS 3040 Interior of the Earth
- EAS 3050 Climate Dynamics

4. Concentration Courses

Four intermediate to advanced-level courses (3000 level and up) that build on the core courses and have prerequisites in the basic sciences and mathematics courses are required. Note that additional basic math and science courses may be required as prerequisites for courses chosen for the concentration. The concentration courses build depth and provide the student with a specific expertise in some facet of Earth system science. The concentration should be chosen during the junior year or before in consultation with an SES advisor whose interests match those of the student. Four concentrations are defined for the major: atmospheric sciences, biogeochemistry, geological sciences, and ocean sciences (see EAS web site for details). Other concentrations can be tailored to a student's interests in concert with the student's

advisor and upon approval of the SES curriculum committee. Examples include sustainable Earth and environmental systems, earth system science and policy, hydrology, planetary science, and soil science.

5. Field/Observational/Laboratory Experience

Exposure to the basic observations of earth science, whether directly in the field, or indirectly by various techniques of remote sensing, or in the laboratory, is necessary to understand fully the chosen area of concentration in the major. A minimum of 3 credits of course work of an observational nature is required. Possibilities include

Courses in the Hawaii Environmental Semester program;

Courses given by the Shoals Marine Laboratory;

EAS 2500 (Meteorological Observations and Instruments);

EAS 3520 (Synoptic Meteorology I);

EAS 4170 (Field Mapping in Argentina);

EAS 4370 (Geophysical Field Methods);

EAS 4910 and/or 4920 (Undergraduate Research, total 3 credits) with appropriate choice of project

Field courses taught by another college or university (3-credit minimum), if approved by advisor.

For more information, contact Professor John Cisne, Department of Earth and Atmospheric Sciences, john.cisne@cornell.edu, or visit www.eas.cornell.edu.

Students may minor in Science of Earth Systems as well. See the EAS web site for more information.

Science of Natural and Environmental Systems

Environmental stewardship and sustainability are increasingly recognized as human and planetary imperatives. This environmental science major will provide you with a strong foundation in the basic sciences, and an introduction to the relationships between the biophysical and social sciences.

Concentrations include environmental agriculture, environmental biology, environmental economics, environmental information science, and sustainable development.

The curriculum comprises an intensive foundation in the sciences; an environmental core with courses covering earth, biotic, social, and economic systems; and several disciplinary programs of study. This major emphasizes inter- and multidisciplinary work, independent thinking and analysis, and development of competency in writing and speaking.

The SNES major is an excellent preparation for careers in governmental or non-governmental organizations responsible for environmental evaluation and policy; professional programs in law, business, journalism; and graduate programs in a variety of environmental science fields (earth science, ecology, environmental engineering, marine biology, soil science).

Foundation Courses

The purpose of this component of the program is to provide a strong foundation in the basic sciences and an introduction to the relationships between the biophysical and social sciences. Many of these courses (listed below) will also contribute to completion of CALS distribution requirements.

- two semesters of college-level biology
- two semesters of college-level calculus
- four semesters of college-level chemistry and physics (at least one semester of each)
- one semester of college-level statistics
- DEA 1500 Introduction to Human-Environment Relationships
- NTRES 2010 Environmental Conservation

The freshman and sophomore years are designed to provide a strong scientific basis for future advanced study and to become engaged in environmental studies through DEA 1500 and NTRES 2010. Depending on student interest and available time, other courses in environmental study may be taken as electives early in the schedule. Advanced placement credit will be accommodated in the program through consultation with the student's faculty advisor.

Environmental Core

The environmental core consists of six courses. Its purpose is to provide a rigorous, integrated understanding of the environment, broadly defined. This core recognizes that knowledge of the environment encompasses physical and biological sciences, social sciences, and human behavior. SNES 1101, required in the freshman year, provides a unifying overview of the goals, depth, and breadth of the major.

Core courses are to provide integration (among areas, disciplines, methodologies, topics, and issues); systems emphasis; basic, rigorous presentation of core material; root competencies for understanding the environment; a framework for further advanced courses; and a new way of thinking that enables innovative solutions to difficult problems.

Biotic Systems: BIOEE 2610 Ecology and the Environment

Colloquium Series: SNES 2000 Environmental Sciences Colloquium

Earth Systems: CSS 3650 Environmental Chemistry: Soil, Air, and Water

Economic Systems: AEM 2500 Environmental and Resource Economics

Environmental Science: SNES 1101 Intro to the Science and Management of Environmental and Natural Resources

Social Systems: DSOC 3240 (STS 3241/SOC 3240) Environment and Society

Programs of Study

Programs of study that focus in one or more areas of environmental science have been established to provide disciplinary expertise sufficient for entry-level professional proficiency. Each student in the major will be required to take four courses at the 3000 level or above in at least one program of study.

Programs of study do not replace or duplicate current majors. Rather, they provide the basic

core of knowledge essential for an introductory understanding of the area—the concepts, basic science, methodologies, and major applications. Programs of study include

Environmental Agriculture

Environmental Biology

Environmental Economics

Environmental Information Science

Sustainable Development

For more information about this major or minor, see <http://snes.eas.cornell.edu>, visit the undergraduate program office in 12 Fernow Hall, or send e-mail to sw38@cornell.edu.

Viticulture and Enology

The juice and wine grape industry is expanding rapidly in New York State, creating opportunities for experts in grape-growing (viticulture), wine-making (enology), wine marketing, and other related scientific fields. In recent years there has been a shortage of qualified personnel to manage vineyards and wineries.

Cornell's new Viticulture and Enology major is creating the next generation of leaders for the wine-grape industry in New York, nationally, and internationally. Its primary focus is on cool climate grapes and wines, addressing the unique challenges of climates, soils, new and traditional grape varieties, and marketing estate-grown wines. The major offers two concentrations: (1) the Viticulture concentration is for those primarily interested in grape growing, and (2) the Enology concentration emphasizes wine production. The curriculum for both concentrations includes many courses in common, and the major provides a strong foundation in the physical and biological sciences. College distribution requirements ensure a broad educational background for all students.

The Viticulture and Enology Program maintains extensive research/teaching vineyards near the Ithaca campus, providing students with hands-on experience producing grapes for juice or fermentation in the enology courses. A new teaching winery is located at the Cornell Orchards next to the Ithaca campus, and at the New York State Agricultural Experiment Station in Geneva, enabling students to learn grape processing, wine-making, and chemical analysis of grapes and wines. Our vineyards include more than 30 wine and table grape varieties, including native American grapes, French-American hybrid grapes, and most of the major European vinifera-type grapes.

The major is closely linked with the New York wineries throughout the state, and student internships at these vineyards and wineries are an integral part of the curriculum. Most of our classes have fewer than 20 students, providing ample opportunities for student/faculty interactions and involvement of undergraduate students in faculty research and outreach programs. In addition, students have access to extension and research activities in viticulture and enology at several research stations, academic departments, and facilities at Cornell University.

Special highlights of this major include:

- Regional focus on the special challenges and opportunities of viticulture and enology in New York and cool-climate areas worldwide

- Hands-on teaching vineyards and student winery near the Ithaca campus
- Flexibility to add electives from the Department of Applied Economics and Management, the School of Hotel Administration, and other Cornell units
- The program draws on the resources of Cornell's Geneva Campus at the New York State Agriculture Experiment Station. The Station includes the USDA-ARS germplasm repository for cool-climate grapes and Cornell's state-of-the-art vinification and brewing technology laboratory

For more information, please see www.grapesandwine.cals.cornell.edu/undergraduate.

Foundation Courses

The purpose of this component of the major is to provide a strong foundation in the basic sciences. Many of these courses (listed below) will also contribute to completion of CALS distribution requirements.

- Two semesters of biology with lab
- Microbiology
- Introductory botany
- Plant function and growth
- Food analysis
- General inorganic and organic chemistry with lab
- Statistics

Core Viticulture and Enology Courses

Several VIEN or Viticulture and Enology major courses including:

- VIEN 1104 Introduction to Wines and Vines
- VIEN 2400 Grape Composition and Analysis
- VIEN 3400 Winemaking Technology
- VIEN 4400 Wine and Grape Flavor Development
- VIEN 4430 and 4440: Viticulture and Vineyard Management I and II
- VIEN 4444 Grapevine Biology

All students are encouraged to complete internships in the wine or grape industry during the summers and to participate in undergraduate research programs on campus. In New York State alone, more than 220 wineries and 600 vineyards are enthusiastic about working with students and hosting interns.

The Minor

Through a minor in Viticulture and Enology, students will learn the essential natural history and biology of wine grapes, systems, and technologies of grape and wine production, as well as the basic chemistry of grape and wine analysis. Those interested in pursuing a minor in Viticulture and Enology need to complete at least 13 credits.

Required Introductory Core Course (4 cr)

VIEN 1104 Wines and Vines (3 cr)

VIEN 1105 Wines and Vines, Lab (1 cr)

Required Upper Level Core Courses (7 cr)

VIEN 3400 Winemaking Practices and Principles (3 cr)

VIEN 3410 Winemaking Lab (1 cr)

VIEN 4430 Viticulture and Vineyard Management I (3 cr)

A minimum of one additional class and 2 additional credits in any course(s) with a "VIEN" designation except 1104, 3400, 3410, 4300, 4430, 4960 must also be taken.

Recommended courses include:

VIEN 2400 Wine and Grape Analysis and Composition (2 cr)

VIEN 4200 Grape Pest Management (3 cr)

VIEN 4400 Wine and Grape Flavor Development (3 cr)

VIEN 4440 Viticulture and Vineyard Management II (3 cr)

VIEN 4444 Grapevine Biology (3 cr)

Any undergraduate student in the college may enroll, subject to availability, in courses required for the minor. Several courses in VIEN have suggested prerequisites, but these requirements may be waived at the discretion of the instructor. Only courses for which a grade of "C" or better is received will count toward the minor in Viticulture and Enology (courses taken with an S-U option will not count).

Special Programs in Agriculture and Life Sciences

Interdisciplinary Studies. The opportunity to develop an independent major in interdisciplinary studies is available for students interested in pursuing a general education in agriculture and life sciences. In consultation with a faculty advisor, students plan a sequence of courses suited to their individual interests, abilities, and objectives. In addition to the distribution and other college requirements, this major may include a concentration of courses in one of several academic units of the college or university. A course of study for interdisciplinary studies must be planned with and approved by a college faculty advisor. Information on the options and names of faculty advisors prepared to advise in special programs are available in the Counseling and Advising Office, 140 Roberts Hall.

DESCRIPTIONS OF COURSES

Undergraduate and graduate courses in the college are offered through the academic departments and units and also through the biological sciences undergraduate program and the Division of Nutritional Sciences.

Descriptions of undergraduate and graduate courses are arranged by department, in alphabetical order.

Graduate study is organized under graduate fields, which generally coincide with the departments. Graduate degree requirements are described in the *Announcement of the Graduate School*. Courses for graduate students are described in the section on the academic department that offers them.

NONDEPARTMENTAL COURSES

ALS 1140 Explorations in Biology Research and Health Professions

Summer. 1 credit. Not for Biological Sciences majors. K. Gellman.

We will explore biology as it pertains to research, health-care professions, and the world at large. This seminar is designed for students with a strong interest in medicine and biological research. Discussions and laboratory exercises will allow students to interact with faculty and guest speakers. We will also learn to read and evaluate scientific publications on current biological topics. Course grade will be based upon a final paper.

ALS 1340/1341 N.Y.S. Emergency Medical Technician—Basic

Fall and spring. 6 credits awarded at completion of course. Full academic-year course requiring fall and spring enrollment. Recommended: basic or advanced first aid. S-U or letter grades. D. A. Grossman, R. Kniffen, and A. E. Gantert.

Intensive 170-hour course taught throughout the fall and spring semesters. Includes training in C.P.R. and defibrillation for the professional rescuer, oxygen administration, airway management, fracture management, bleeding control, spinal immobilization, patient assessment, emergency pharmacology, and the use of medical antishock trousers. Students qualify for the New York State E.M.T.—Basic certification process. Examinations upon successful completion of the course.

ALS 1350 Advanced N.Y.S. Emergency Medical Technician—Intermediate

Fall. 4 credits. Prerequisite: current certification as N.Y.S. Basic E.M.T. or have applied for reciprocity. S-U or letter grades. D. Grossman and staff.

Includes topics such as emergency pharmacology, patient assessment, advanced cardiac life support, emergency hypoperfusion management, and basic trauma life support. Uses classroom, lab, hospital, and field sessions to teach skills such as intubation, emergency IV access, electro-cardioversion and defibrillation, and patient assessment and pharmacological intervention. Requires extensive out of classroom time.

ALS 3920 New York State Government Affairs (also HE 3920)

Spring. 15 credits. Prerequisite: junior or senior standing; minimum GPA of 2.3. R. Canfield.

For description see HE 3920.

ALS 4000 Community Service Learning Project

Fall and spring. 3 credits. Prerequisite: none. Letter grades only. B. Chabot.

Students will develop an independent community-based project that will achieve both service and learning objectives. Learning objectives include skills in research, critical thinking, and leadership. Students will gain knowledge in community needs assessment, project planning, design, implementation, and evaluation. Faculty members will mentor students in developing community partnerships, research, and project planning.

ALS 4770 Environmental Stewardship in the Cornell Community

Spring. 2–4 credits, variable; may be taken more than once. J. M. Regenstein. Each student or team of students undertakes an original project to improve the environment at Cornell or in Tompkins County. Often the projects will involve working with the Cornell infrastructure (generally campus life and/or facilities). Through class discussions, students learn how to be more effective at developing environmental programs in the future, both during and after college. Students present a final oral report at a public forum to which senior Cornell administrators are invited. The final written report will be made public.

ALS 4940 Special Topics in Agriculture and Life Sciences

Fall or spring. 4 credits max. S–U or letter grades.

The college teaches “trial” or temporary courses under this number. Offerings vary by semester and are advertised by the college before the beginning of the semester. The same course is not offered more than twice under this number.

ALS 4960 Internship

Fall, spring, or summer. 6 credits max. Not open to students who have earned internship credits elsewhere or in previous semesters. S–U grades only.

Students may register only for internships in the New York State Assembly Intern Program, the New York State Senate Session Assistant’s Program, and the Albany Semester Program. A learning contract is negotiated between the student and the faculty supervisor(s), stating conditions of the work assignment, supervision, and reporting. Requires participation in any structured learning activities associated with the internship.

ALS 4991/4992 Honors Project I and II (also BSOC/STS/HE 4991/4992)

Fall and spring (yearlong). 8 credits (register for 4 credits each semester; total credits awarded is 8). Prerequisite: biology & society seniors and permission of department; overall GPA of 3.3. Apply in 306 Rockefeller Hall.

Students who are admitted to the honors program are required to complete two semesters of honors project research and to write an honors thesis. The project must include substantial research and the completed work should be of wider scope and greater originality than is normal for an upper-level course.

ALS 4998 Politics and Policy: Theory, Research, and Practice (also AMST/PAM/GOVT 4998)

Students in CALS must register for ALS 4998. S. Jackson and staff.

This course, taught in Washington, D.C., forms the core of the public policy option of the Cornell in Washington program. The central objective is to provide students with the instruction and guidance necessary to analyze and evaluate their own chosen issue in public policy. Toward that end, the course has three components: (1) weekly lectures providing background on the structures and processes of national politics and policy as well as training in research methodology; (2) student externships; and (3) individual research papers or projects. All three components interrelate to provide students with a strategy and framework for integrating

classroom-based learning, field experience, and individual research. Students apply through the Cornell in Washington office, M101 McGraw Hall, or online at ciw.cornell.edu.

ALS 5100 Leadership Development for Life Scientists

Spring. 3 credits. Prerequisite: invitation or permission of instructor. S–U grades only. M. Pritts, C. Warzynski, and L. Gasser.

Formal training and practice of skills required for leading people in an academic or business environment. Skills include coaching, feedback, managing conflict, fostering teamwork, creating vision, and developing diversity. A significant portion is devoted to understanding one’s own strengths and weaknesses and how to recognize and use strengths in others.

ALS 5800 International Teaching Assistant Development Program Course 3

Fall or spring. 2 credits. Prerequisite: EDUC 5790. ITADP staff.

Specifically designed for international graduate students who plan to assume teaching assistant responsibilities that range from lab introductions to individual tutoring sessions. Participants address English-language issues relating to phonemes, grammar, and suprasegmentals. Activities in these areas target communicative functions such as presenting concepts, initiating and sustaining conversation, and interpreting information in academic settings.

ALS 5810 International Teaching Assistant Development Program Course 4

Fall or spring. 2 credits. Prerequisite: ALS 5800. ITADP staff.

Specifically designed for international graduate students who have completed ALS 5800 and who plan to assume teaching assistant responsibilities that range from lab introductions to individual tutoring sessions. Participants develop skills in self-monitoring, critical listening, and language fluency with attention to time frame usage, academic terminology, extended discourse, and compensatory speech strategies.

ALS 6610–6611 Environmental Policy (also BSOC 4611–4612, BIOEE 6610–6611)

6610, fall; 6611, spring. 3 credits each semester; students must register for 6 credits each semester since “R” grade is given at end of fall semester. Limited to 12 students. Prerequisite: permission of instructor. D. Pimentel.

For description, see BIOEE 6610.

AGRICULTURAL SCIENCES

D. Brown, D. Buckley, W. Camp, D. Cherney, P. Dewey, A. DiTommaso, L. Drinkwater, G. Fick, B. Gloy, R. Gravani, P. Hobbs, Q. Ketterings, W. Knoblauch, J. Losey, R. Nelson, T. Park, T. Setter, M. Smith, M. Van Amburgh, D. Viands, C. Wien

The Agricultural Sciences major is an interdisciplinary program for students wishing to pursue a general education in agriculture to prepare for careers that require a scientific and integrative understanding of agriculture and food systems. Students can concentrate in one or more areas including: Animal

Science, Agriculture Economics and Management, Education and Communication, Crop Production and Management, and Sustainable Agriculture.

AGSCI 2940 Introduction to Agricultural Machinery (also CSS/HORT 2940)

Fall. 2 credits. B. Flannigan and A. DiTommaso.

For description, see CSS 2940.

AGSCI 3800 Organic Food and Agriculture (also CSS/HORT 3800)

Fall. 3 or 4 credits. Prerequisites: CSS 1900, CSS 2600, HORT 1101 recommended, or permission of instructor. Staff.

For description, see CSS 3800.

AGSCI 4010 Seminar in Agricultural Sciences

Fall or spring. 1 credit. S–U grades only. A. DiTommaso.

Students in this weekly seminar series will learn about current debates and hot issues in the agricultural sciences today from both local and global perspectives. It will include both Agricultural Sciences majors presenting on internship and capstone experiences, and invited guest speakers. The target audience is Agricultural Sciences majors. Students are required to prepare a weekly reflection on each presentation. This course creates a weekly forum in which majors in our interdepartmental program can gather to learn and discuss important issues in agricultural sciences, while at the same time building community within our Agricultural Sciences major program.

AGSCI 4940 Special Topics in Agricultural Sciences

Fall or spring. 4 credits max. A. DiTommaso.

The department teaches “trial” courses, and special topics not covered in other courses, at the undergraduate level, under this number. Offerings vary by semester and will be advertised by the department. Courses offered under the number are approved by the department curriculum committee, and the same course is not offered more than twice under this number.

AGSCI 4960 Internship in Agricultural Sciences

Fall, spring, or summer. 1–3 credits variable, 6 credits maximum. Prerequisite: permission of student’s advisor in advance of participation in internship programs. S–U or letter grades. Staff.

In this experiential learning opportunity, students will participate in structured, on-the-job learning under supervision of qualified professionals in a cooperating external organization. Internships and learning goals are arranged by the student in conjunction with an internship advisor and the internship host. Course may be taken multiple times for up to 6 credits. All 4960 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

AMERICAN INDIAN STUDIES

The American Indian Program offers a minor in American Indian Studies to undergraduate students. The minor is earned upon the completion of five courses: AIS 1100 and AIS 1110, plus at least three other courses from the

AIS curriculum, for a minimum total of 15 credit hours. The three additional courses must include one course from Group A (arts and humanities) and one course from Group B (social and natural sciences) as listed below. One of the courses offered toward the minor must be at the 3000 or 4000 level. Only one 3-credit independent study (AIS 4970) may be counted toward the minor. Only program-listed courses for which the student has earned a letter grade of C or better will be counted toward the minor. No courses taken for S-U credit will be counted toward the minor. A number of older courses no longer offered by AIP do count toward the minor, as do courses with the same title that were numbered using the old three-digit system. Students seeking to minor in American Indian studies or determining the eligibility of a course are encouraged to contact Professor Kurt Jordan, associate director for academic development, at kj21@cornell.edu. Application materials for the minor may also be obtained from the AIP office, 4th floor, Caldwell Hall. Students are also advised to consult www.aip.cornell.edu/academic.htm for the most up-to-date listings of course offerings.

Minor in American Indian Studies

Required Courses

AIS 1100 Introduction to American Indian Studies I: Indigenous North America to 1890

AIS 1110 Introduction to American Indian Studies II: Contemporary Issues in Indigenous North America

Electives

(Group A, Arts and Humanities)

AIS 2360 Native Peoples of the Northeast

AIS 2390 Seminar in Iroquois History

AIS 2600 Survey of Native American Literatures in the United States

AIS 2660 Introduction to Native American History

AIS 3860 Contemporary American Indian Fiction of the United States

AIS 4300 Native American Philosophies

AIS 4860 American Indian Women's Literature

AIS 4900 New World Encounters, 1500-1800

(Group B, Social and Natural Sciences)

AIS 2200 Field Course in Iroquois Archaeology

AIS 2350 Archaeology of North American Indians

AIS 3110 Social Movements

AIS 3330 Ways of Knowing

AIS 3400 Contested Terrain: Hawaii

AIS 3480 Iroquois Archaeology

AIS 4000 Critical Approaches to American Indian Studies

AIS 4600 Field and Analytical Methods in American Indian Archaeology

AIS 4720 Historical Archaeology of Indigenous Peoples

(Independent Study)

AIS 4970 Independent Study

AIS 6970 Individual Study in American Indian Studies

E. Cheyfitz, director; K. Kassam, C. Andronicos, L. Donaldson, C. Geisler, A. Gonzales, K. Jordan, J. Mt. Pleasant, J. Parmenter, T. Richardson, J. Rickard

AIS 1100 Introduction to American Indian Studies I: Indigenous North America to 1890 (CA) (HA)

Fall. 3 credits. P. Nadasdy.

Provides an interdisciplinary introduction to American Indian cultures and histories from Precolumbian times to 1890, emphasizing the current relevance of traditional values and the ways the deep past continues to affect present-day Indian peoples. Course materials draw on perspectives from the humanities, social sciences, and expressive arts.

AIS 1110 Introduction to American Indian Studies II: Contemporary Issues in Indigenous North America (CA) (HA)

Spring. 3 credits. K. Kassam.

Interdisciplinary exploration of contemporary issues in American Indian country north of Mexico after 1890. Examines Indian sovereignty, nationhood, agency, and engagement through time using the perspective of American Indian studies. Course materials are drawn from the humanities, social science, and expressive arts.

AIS 2200 Field Course in Iroquois Archaeology (also ANTHR/ARKEO 2200) (HA) (SBA)

Summer. 3 credits. Letter grades only. K. Jordan.

This course provides hands-on-training in archaeological field methods through survey and excavation at historic-period Iroquois (Haudenosaunee) sites in the Finger Lakes region. Most class time will consist of supervised excavation of past residential and domestic areas, supplemented by lectures on archaeological methods and Iroquois history and material culture.

AIS 2350 Archaeology of North American Indians (also ANTHR 2235) (CA) (HA)

Next offered 2010-2011.]

AIS 2360 Native Peoples of the Northeast, Pre-Contact to the Present (also HIST/AMST 2360) (CA) (HA)

Spring. 4 credits. Next offered 2011-2012. J. Parmenter.

For description, see HIST 2360.]

AIS 2390 Seminar in Iroquois History (also HIST 2390) (CA) (HA)

Fall. 4 credits. Next offered 2011-2012. J. Parmenter.

For description, see HIST 2390.]

AIS 2600 Survey of American Indian Literatures in the United States (also ENGL 2600) (LA) (CA)

Spring. 4 credits. Next offered 2011-2012. E. Cheyfitz.

For description, see ENGL 2600.]

AIS 2660 Introduction to Native American History (also HIST/AMST 2660) (CA) (HA) (D)

Spring. 4 credits. Next offered 2010-2011. J. Parmenter.

For description, see HIST 2660.]

[AIS 3110 Social Movements (also DSOC/LSP 3110)]

Fall. 3 credits. Prerequisites: DSOC/SOC 1101 or permission of instructor. S-U or letter grades. Next offered 2010-2011. A. Gonzales.

This course examines the transnational dimensions of social movements to assess the implications of globalization for political mobilization and the ways that social movement actors engage the global political process to effect social change.]

AIS 3330 Ways of Knowing: Indigenous and Local Ecological Knowledge (also NTRES 3330) (CA, SBA) (D)

Fall. 3 credits. Prerequisite: junior, senior, or graduate standing. Letter grades only. K. Kassam.

For description, see NTRES 3330.

AIS 3400 Contested Terrain: Hawaii (also SOC 3420) (CA) (SBA)

Spring. 3 credits. Prerequisite: introductory or intermediate-level social sciences or history. M. M. Hamabata.

This course, offered through Earth and Atmospheric Sciences' program in Hawaii, draws from the fields of history, political science, and sociology to present an historical understanding of contemporary Hawaiian society. Topics include Western contact, establishment of Western institutions, overthrow of a sovereign government, annexation, integration into the United States. Direct experience with Hawaiian leaders and institutions are incorporated to address contemporary issues: sovereignty, economic development/dependency, social change, and land use as a sociopolitical and cultural struggle. Students should consult www.eas.cornell.edu/cals/eas/academics regarding the status of this course.

AIS 3422/6422 Culture, Politics, and Environment in the Circumpolar North (also ANTHR 3422/6422) (CA)

Spring. 4 credits. Prerequisite: none. Letter grades only. P. Nadasdy.

For description, see ANTHR 3422/6422.

[AIS 3480/6480 Iroquois Archaeology (also ANTHR 3480/6480) (CA) (HA)]

Fall. 4 credits. S-U or letter grades. Next offered 2011-2012. K. Jordan.

For description, see ANTHR 3248/6248.]

[AIS 3860 Contemporary American Indian Fiction (also ENGL 3670) (LA) (CA)]

Fall. 4 credits. Next offered 2011-2012.

Examines contemporary American Indian fiction as a response to the colonial structure of federal Indian law. Beginning with Mourning Dove's *Cogewea*, a novel of the Allotment Era, students read works by a range of Native fiction writers (from a list that includes McNickle, Welch, Silko, Vizenor, Hogan, Alexie, Walters, Glancy, and Red Corn) that respond critically to U.S. federal Indian policy.]

AIS 4000 Critical Approaches to American Indian Studies (also AIS 6000) (CA) (HA)

Fall. 4 credits. Prerequisite: advanced undergraduates or graduate students; permission of instructor. Course requirements differ at 4000 and 6000 levels. S-U or letter grades. Staff.

An interdisciplinary survey of the literature in Native American Studies. Readings engage themes of indigeneity, coloniality, power, and "resistance." The syllabus is formed from

some "classic" and canonical works in Native American Studies but also requires an engagement with marginal writings and theoretical and historical contributions from scholars in other disciplines.

AIS 4300 Native American Philosophies (also ENGL/AMST 4300) (KCM) (LA)

Fall. 4 credits. Prerequisite: permission of instructor. E. Cheyfitz.

This course will focus on American Indian, Native Alaskan, and Native Hawaiian social, spiritual, legal, political, aesthetic, scientific, environmental, and historical thought from the pre-invasion period (before 1492) to the present as it is contained in both oral narratives and written texts (nonfiction, fiction, and poetry).

[AIS 4600 Field and Analytical Methods in American Indian Archaeology (also ANTHR/ARKEO 4260) (SBA) (HA)]

Next offered 2011–2012.]

AIS 4720/7220 Historical Archaeology of Indigenous Peoples (also ANTHR/ARKEO 4272/7272) (CA) (HA)

Fall. 4 credits. K. Jordan.

Seminar examining the responses of indigenous peoples across the world to European expansion and colonialism over the past 500 years. Archaeological case studies from North America, Africa, and the Pacific provide a comparative perspective on Postcolumbian culture contact and illustrate how archaeology can both supplement and challenge document-based histories.

[AIS 4860 American Indian Women's Literature (also ENGL 4860) (LA) (CA)]

Spring. 4 credits. Next offered 2010–2011. For description, see ENGL 4860.]

[AIS 4900 New World Encounters, 1500 to 1800 (also HIST/AMST 4990) (CA) (HA)]

Next offered 2011–2012.]

AIS 4970 Independent Study

Fall or spring. 1–4 credits. Staff.

Topic and credit hours TBA between faculty member and student. The American Indian Program office must approve independent study forms.

AIS 6000 Critical Approaches to American Indian Studies (also AIS 4000)

Fall. 4 credits. Staff.

For description, see AIS 4000.

AIS 6010 American Indian Studies Proseminar

Fall and spring. 1 credit. Staff. graduate-level course that introduces students to ongoing research in the field of American Indian Studies in a proseminar/colloquium format. Advanced graduate students are expected to present their work in progress; all are expected to attend each seminar and provide presenters with critical and constructive commentary on papers.

[AIS 6350 Indigenous Peoples and Globalization (also DSOC/LATA 6350)]

Fall. 3 credits. Next offered 2010–2011. A. Gonzales.

Explores ways in which processes of globalization affect indigenous peoples worldwide and the strategies indigenous peoples are using to deal with those

pressures. At issue are the lands, resources, traditional knowledge, and indigenous struggles for recognition and self-determination.]

[AIS 6610 Colonial American Literatures (also ENGL/AMST 6610)]

Spring. 4 credits. Next offered 2010–2011. E. Cheyfitz.

For description, see ENGL 6610.]

[AIS 6710 Law and Literature in the Antebellum United States (also ENGL 6710)]

Spring. 4 credits. Next offered 2010–2011. E. Cheyfitz.

For description, see ENGL 6710.]

AIS 6970 Individual Study in American Indian Studies

Fall, spring, or summer. 1–3 credits. S–U or letter grades. Staff.

A student may, with approval of a faculty adviser, study a problem or topic not covered in a regular course or may undertake tutorial study of an independent nature in an area of interest in American Indian Studies.

APPLIED ECONOMICS AND MANAGEMENT

L. W. Tauer, chair (154 Warren Hall, 255 4576); C. B. Barrett, J. Bennett, A. Bento, N. L. Bills, G. Blalock, V. L. Bogan, R. N. Boisvert, N. H. Chau, R. D. Christy, J. M. Conrad, R. T. Curtis, H. Daouk, H. deGorter, B. O. Earle, B. A. Gloy, C. Gomes, M. Gomez, D. A. Grossman, D. R. Just, H. M. Kaiser, S. M. Kanbur, W. A. Knoblauch, S. C. Kyle, D. R. Lee, A. E. Leiponen, W. H. Lesser, E. E. Lewis, J. W. Lippitt, J. E. Little, E. W. McLaughlin, T. D. Mount, D. T. Ng, C. F. Nicholson, A. M. Novakovic, P. D. Perez, D. J. Perosio, G. L. Poe, E. Prasad, J. T. Prince, C. K. Ranne, T. M. Schmit, W. D. Schulze, D. H. Simon, M. W. Stephenson, D. H. Streeter, W. G. Tomek, C. G. Turvey, C. L. vanEs, B. Wansink, A. Wessels, G. B. White

AEM 1101 Introduction to Applied Economics and Management

Fall. 1 credit. Required of and limited to freshmen in AEM. S–U grades only.

D. A. Grossman and A. M. Novakovic.

The purpose of this course is to acquaint first-year students in AEM with their new department and better enable them to make academic and early-career decisions. A cross-section of faculty will lead discussions that introduce most of the major academic subjects taught in AEM. In addition, there are presentations on student organizations and course planning and an assignment on the use of library resources.

AEM 1102 Personal Evaluation and Development

Spring. 1 credit. Required of and limited to first-year majors in AEM. S–U grades only. A. M. Novakovic.

This course is designed to help students better understand their personal and professional skills and attributes and enhance their abilities in areas such as teamwork, leadership, trust, ethics, and diversity and what this means for interpersonal relationships. The weekly meeting will either be one plenary lecture or a smaller lab.

Students will learn by experience and have guest lecturers from the business community.

AEM 1200 Introduction to Business Management

Fall, spring, summer. 3 credits. Two evening prelims. P. D. Perez.

Provides an overview of management and business. Human resource, marketing, finance, and strategy concerns are addressed with consideration paid to current issues such as technological innovation and its impact on operations, globalization, ethics, teamwork, leadership, and entrepreneurship. Opportunity to deliver an integrative group project.

AEM 1210 Entrepreneurship Speaker Series

Fall. 1 credit. P. D. Perez.

Course consists of guest lectures by faculty members engaged in the study and practice of entrepreneurship and by prominent entrepreneurs associated with the entrepreneurship@Cornell program, with a view to inform and inspire students. Evaluation includes attendance, book reports, and written feedback on lectures.

AEM 1220 Entrepreneurship in the Life Sciences

Spring. 1 credit. W. Lesser.

Seminars and guest lectures by faculty members and entrepreneurs engaged in the study and practice of entrepreneurship in the life sciences. Emphasis on the process of turning scientific discovery into business opportunity and success. Evaluation includes attendance and written feedback on lectures. Intended as a follow-up to AEM 1200 and AEM 1210 but may be taken independently.

AEM 1230 Foundations of Entrepreneurship and Business

Fall and spring. 2 credits. P. D. Perez.

Introductory course providing a sound base to both the understanding of entrepreneurial activity and possibilities and the study and practice of entrepreneurship at Cornell. Emphasis on the identification and elaboration of business opportunities (i.e., business ideas). Extensive use of IT-based learning and presentation tools.

[AEM 2000 Contemporary Controversies in the Global Economy]

AEM 2100 Introductory Statistics

Spring. 4 credits. Prerequisite: college algebra. Two evening prelims. C. van Es.

Introduces statistical methods. Topics include the descriptive analysis of data, probability concepts and distributions, estimation and hypothesis testing, regression, and correlation analysis. Includes an introduction to Minitab, a statistical software package.

AEM 2190 Introduction to Applied Portfolio Management

Summer. 4 credits. Special program. D. Dase.

Based in New York City's Financial District. Topics include capital markets; the impact of the economy and the Federal Reserve System; recent stock market history; regulation; investment banking and management principles of both institutional and individual portfolios. Industry guest speakers provide unique perspectives. An individualized internship is required of all students.

AEM 2210 Financial Accounting

Fall, summer. 3 credits. Not open to freshmen. Priority given to CALS majors. Two evening prelims. J. Little.

Comprehensive introduction to financial accounting concepts and techniques, intended to provide a basic understanding of the accounting cycle, elements of financial statements, underlying theory of GAAP, and financial statement interpretation. Topics include methods of recording inventory, receivables, depreciation, bonds, and equity. Requires two evening prelims and a comprehensive final; weekly homework assignments.

AEM 2240 Principles of Finance

Summer. 3 credits. R. Curtis.

This course focuses on the mathematics of finance, the economics of managerial decisions, corporate financial policy, risk management, and investments. Topics include time value, bonds, stock valuation, capital budgeting, financing alternatives, costs of capital, the capital structure decision, distribution policy, mergers and acquisitions, options, forward and futures contracts, market efficiency and market anomalies, strategies of successful investors, and personal finance.

AEM 2250 AEM Certificate in Business Management Consulting Project

Summer 1 credit. R. Curtis and P. Perez.

Student teams consult with local organizations in central New York and suggest solutions to problems those organizations are currently facing. Students will apply business principles they have learned during their AEM Certificate in Management summer immersion program. Each team will prepare a written report and will give a presentation to AEM Certificate faculty and representatives of the organization the team is working with.

AEM 2260 AEM Certificate Activities

Summer. 1 credit. Staff.

Students participate in special activities as part of the AEM Certificate in Business Management summer immersion program. While activities may vary from year to year, in the past these activities have included a field trip to corporate sites in New York City, Cornell Outdoor Education team building and leadership exercises, a career services résumé/job search presentation, and a talk on the evolution of a local small business by its founder. Student participation in all activities is mandatory and a paper focusing on "take-aways" from each activity is required.

AEM 2270 Introduction to International Business

Summer. 4 credits. D. Ng.

Based in the global finance center of Hong Kong, students will gain a fundamental understanding of how some of the most powerful multinational firms in the world make and implement financial decisions, how they manage risk and gain competitive advantage, how they interact with governments, and what the risks and returns are in conducting such international business. Students will be assigned to internships in order to experience firsthand how such corporations function.

AEM 2300 International Trade and Finance (also ECON 2300) (SBA)

Spring. 3 credits. Prerequisites: ECON 1110 or equivalent. Recommended: ECON 1120 or equivalent. S-U or letter grades. One evening prelim. D. R. Lee.

One-semester introduction to international economic principles and issues. Begins by

surveying key topics such as the elements of comparative advantage, tariff and nontariff barriers, and multilateral institutions. The second part of the course treats selected topics in international finance, including exchange rates, balance of payments, and capital markets. Discusses current issues such as the effects of trade liberalization, trade and economic growth, and instability in international capital markets. Designed as a less technical introduction to concepts developed at a more advanced level in AEM 4300 and ECON 3610-3620.

AEM 2400 Marketing

Fall, summer. 3 credits. E. W. McLaughlin.

Provides a broad introduction to the fundamentals of marketing. Explores the components of an organization's strategic marketing program, including how to price, promote, and distribute goods and services. Industry guest lectures and current marketing applications from various companies are presented and analyzed.

AEM 2410 Marketing Plan Development

Fall, spring. 2 credits. Requirement for and limited to AEM majors. Prerequisite: AEM 2400. D. J. Perosio.

Offers student teams the opportunity for an intense, hands-on application of basic marketing concepts through research and development of a marketing plan. Guided by a series of assignments, teams develop key components that are integrated into a comprehensive written plan for a local business.

AEM 2500 Environmental and Resource Economics (SBA)

Fall. 3 credits. S-U or letter grades.

G. Poe.

Introduces fundamental economic principles and the "economic approach" to policy issues, and demonstrates how these concepts underpin contemporary environmental and natural resource issues and policy solutions. Subjects include valuation, benefit-cost analysis, policy design, property rights, and ecological economics. Uses these tools to explore major current policy issues such as economic incentives in environmental policy, endangered species protection, air and water pollution, depletion of renewable and nonrenewable resources, and global warming.

AEM 3020 Farm Business Management

Fall. 4 credits. Not open to freshmen.

Prerequisite for AEM 4050 and 4270.

W. A. Knoblauch.

Intensive study of planning, directing, organizing, and controlling a farm business, with emphasis on the tools of managerial analysis and decision making. Topics include financial statements, business analysis, budgeting, and acquisition, organization, and management of capital, labor, land, buildings, and machinery.

AEM 3200 Business Law I (also NBA 5600)

Fall and summer. 3 credits. Prerequisite: junior, senior, or graduate standing. One evening prelim. D. A. Grossman.

Examines legal problems of particular interest to persons who expect to engage in business. Emphasizes the law of contracts, sales, agency, and property.

AEM 3210 Business Law II (also NBA 5610)

Spring. 3 credits. Prerequisite: junior, senior, or graduate standing; business law course or permission of instructor.

D. A. Grossman.

The first portion of this course examines legal issues in the formation and operation of business enterprises, particularly partnerships, corporations, and limited-liability companies. The second portion reviews selected topics in business law, like employment discrimination, debtor/creditor relations, product liability, unfair competition, e-commerce law, and international business law.

[AEM 3220 Internet Strategy]

AEM 3230 Managerial Accounting

Spring. 3 credits. Priority given to CALS majors. Prerequisite: AEM 2210 or

equivalent. One evening prelim. J. Little.

Introduction to cost accounting emphasizing the application of accounting concepts to managerial control and decision making. Major topics include product costing, standard costing, cost behavior, cost allocation, budgeting, variance analysis, and accounting systems in the manufacturing environment. Requires use of electronic spreadsheets. Includes an evening prelim, a second exam, weekly homework.

AEM 3240 Finance (also PAM 5620)

Fall and spring. 4 credits. Priority given to CALS majors. Prerequisites: AEM 2100, 1200, and 2210, or equivalents. Three evening prelims. R. Curtis.

Focuses on the mathematics of finance, valuation, and the economics of managerial decisions, corporate financial policy, risk management, and investments. Topics include the time value of money, bond and stock valuation, capital-budgeting decisions, financing alternatives, the cost of capital and the capital-structure decision, distribution policy, mergers and acquisitions and restructuring, options, forward and futures contracts, market efficiency and market anomalies, strategies of successful investors, and personal finance.

AEM 3250 Personal Enterprise and Small Business Management

Spring. 4 credits. Prerequisites: junior or senior standing; AEM 1200 and 2210 or permission of instructor. Absolutely no adds or drops after second class meeting. Cost of term project: approx. \$100 per team. D. Streeter.

Focuses on the activities involved in planning a start-up business, including the exploration of strategic dimensions, performance of marketing research, and planning of financial aspects related to the new company. Lectures and hands-on clinics include visits by real-world entrepreneurs, who discuss the start-up process and the challenges of managing growth in a small business. Term project is the development of a business plan, completed in teams of no fewer than three students.

AEM 3280 Innovation and Dynamic Management (also HADM 4443)

Spring. 3 credits. Prerequisite: junior or senior standing. Staff.

For description, see HADM 4443.

[AEM 3290/3291 International Agribusiness Study Trip

3291, fall; 3290, spring. 2 credits. Prerequisites: AEM 1200 or 3020, and 2400. Open by application before March 1 of spring semester before course is offered. Approximately 12 students are selected with preference given to sophomores and juniors in CALS. Field study co-payment: \$800. B. Gloy and T. Schmit.

Gives students interested in agribusiness management exposure to the managerial practices essential to the success of agriculture, agribusiness, and food companies competing in the global marketplace. Involves a two-week international field study trip that takes place after the final exam period of the spring semester before the course is offered. The course meets for a few sessions in advance of the field study trip. A paper analyzing an aspect of the field study is required.]

AEM 3300 Managerial Economics and Decision Making

Spring. 3 credits. Prerequisite: ECON 1110. D. Simon.

Focuses on tools for making various decisions managers encounter in the real world, including decisions of pricing, output, advertising expenditures, and new product introductions. Considers issues such as how to estimate a firm's demand and cost functions as considered in making such decisions. Compares standard microeconomic models with more realistic approaches to making decisions. Emphasizes considering decisions that are less stylized and more similar to those managers face on a regular basis.

AEM 3310 Economics of Business Regulation

Spring. 3 credits. Prerequisites: ECON 1110, 3130, and AEM 1200. S-U or letter grades. J. Prince.

Studies the economics and other factors (e.g., politics, lobbying) that determine regulation policy along with firm strategies in regulated or potentially regulated markets. Major topics include antitrust, economic regulation, and environmental regulation. Applications to the current business environment are emphasized.

[AEM 3330 European Business Institutions]**AEM 3340 Women, Leadership, and Entrepreneurship**

Fall. 1 credit. Prerequisite: junior or senior standing. D. Streeter.

Seminar that uses lectures, guest panels, and readings to focus on issues facing women (and their partners) in their business careers. Topics include status of women in business leadership, pathways and strategies for leadership development, family/life balance issues, gender issues in the workplace, and resources for emerging leaders.

AEM 3350 International Technology Marketing of Biotechnology

Spring. 3 credits. Prerequisites: ECON 1110 and BIOG 1109 or equivalents. S-U or letter grades. W. H. Lesser.

Explores international technology marketing from an economics perspective using biotechnology as an example. Topics include technology theories, products, risk (health

and environmental) regulation, industry structure, labeling uses and regulations, public perceptions, patents, trade, and international conventions. The course is of interest to students of biotechnology, public technology policy, and international technology marketing.

AEM 3360 Intermediate Accounting I

Fall. 3 credits. Prerequisites: AEM 2210 and 3230. Staff.

Includes an overview of Generally Accepted Accounting Principles, balance sheet valuation, and income measurement and recognition. Other topics include accounting for pensions, earnings per share, and special financial reporting issues.

AEM 3370 Intermediate Accounting II

Spring. 3 credits. Prerequisite: AEM 3360 Intermediate Accounting I. Staff.

Continuation of the in-depth study of accounting theory, generally accepted accounting principles, and the techniques involved in measuring, recording, summarizing, and reporting financial data for business organizations. Learn the GAAP accounting for equities, revenue, investments, accounting changes, and statement of cash flows. Understand accounting alternatives within GAAP and accounting alternatives to GAAP for the topics covered so that students are prepared to understand and use future changes in GAAP.

AEM 3380 Social Entrepreneurs, Innovators, and Problem Solvers

Fall. 4 credits. A. Wessels.

This course introduces students to the social entrepreneurs, innovators, and visionaries who are creating new strategies for solving society's problems. The course highlights innovative case studies of success in restoring the environment, resolving conflicts, curing diseases, overcoming poverty, and addressing other problems of social injustice. At the end of the course, each student develops an original blueprint for social innovation: a creative proposal for solving a societal problem.

[AEM 3420 Integrated Marketing Communication]**AEM 3440 Consumer Behavior**

Fall. 3 credits. Prerequisites: AEM 2400 or equivalent. Preference given to AEM majors. B. Wansink.

Develops a useful, conceptual understanding of the problems and strategies associated with psychology behind consumer behavior. In doing so, the course provides frameworks that enable students to address these issues responsibly, systematically, and creatively.

AEM 3460 Dairy Markets and Policy

Spring. 3 credits. Prerequisites: junior, senior, or graduate standing. ECON 1110 or equivalent. S-U or letter grades. A. Novakovic.

Survey of topics related to the structure and performance of U.S. dairy markets and federal and state policies that regulate market activities.

AEM 4020/4021 Food and Brand Lab Workshop

Fall and spring. 6 credits total. Prerequisite: permission of instructor. B. Wansink.

The purpose of the Food and Brand Lab Workshop is to provide students with an advanced opportunity to develop an

advanced understanding of consumers by involving them in collaborative, theory-based research related to food. This course is focused on asking and answering the "why" questions behind consumer behavior. Fall-semester students will receive an "R" grade and then receive their grade for course in the spring semester.

AEM 4030 Farm Management Study Trip

Spring. 1 credit. Prerequisite: AEM 3020.

Open by application only.

W. A. Knoblauch and B. Gloy.

Special program to study production and management systems in diverse agricultural regions of the United States. Includes a trip (usually taken during spring break) to the region being studied. A different region is visited each year. The course meets in advance of the study trip and upon return from the trip. Students must write a paper that further explores an aspect of the trip.

AEM 4040 Financial Management for Agriculture and Agribusiness

Spring. 3 credits. Prerequisites: AEM 4050 or equivalent; permission of instructor.

C. Turvey.

To expand students' knowledge base of finance as it relates to agriculture and agricultural business. The course will follow three main themes: Capital Budgeting and Project Valuation; Cost of Capital; Risk Management.

AEM 4050 Agricultural Finance

Spring. 3 credits. Prerequisite: AEM 3020 or equivalent. Recommended: calculus and statistics. C. Turvey.

Discusses the principles and practices used in financing agricultural businesses, from the perspectives of the business owner and the lender. Topics include sources of capital, financing entry into agriculture, financial analysis of a business, capital management, financial statements, credit instruments, loan analysis, financial risk, and leasing.

AEM 4100 Business Statistics

Fall. 3 credits. Prerequisite: AEM 2100 or equivalent. C. van Es.

Focuses on techniques used to analyze data from marketing research, business, and economics. Topics include experimental design and ANOVA, contingency-table analysis, quality-control methods, time-series analysis and forecasting. Also includes brief introductions to nonparametric methods and multivariate analysis. Involves a research project designed to give experience in collecting and interpreting data.

AEM 4110 Introduction to Econometrics

Fall. 3 credits. Prerequisite: AEM 2100 and either ECON 3130 or PAM 2000 or equivalents. D. Just.

Introduces students to basic econometric principles and the use of statistical procedures in empirical studies of economic models. Assumptions, properties, and problems encountered in the use of multiple regression are discussed as are simultaneous equation models, simulation, and forecasting techniques.

AEM 4120 Computational Methods for Management and Economics

Fall. 3 credits. Primarily for juniors, seniors, and M.S. degree candidates. Prerequisite: AEM 2100 or equivalent. C. Gomes.

Course in applied mathematical programming. Emphasizes formulation of and interpretation of solutions to mathematical models of problems in economics and business. Studies blending, resource allocation, capital budgeting, transportation and financial planning, and inventory management. Introduces integer and nonlinear programming.

AEM 4130 Business Strategy Research

Fall. 3 credits. Prerequisite: AEM 2100 or equivalent statistics course; permission of instructor. G. Blalock.

AEM 4130 introduces empirical microeconomic research methods applied primarily to questions of business strategy. The course objective is to familiarize students with the potential problems of business strategy research and the methods employed to overcome those problems. Students will read and discuss peer-reviewed academic journal articles in business and economics.

AEM 4140 Behavioral Economics and Managerial Decisions

Fall. 3 credits. Prerequisites: junior or senior standing; ECON 3130 or PAM 2000. Lab fee: \$40. D. Just and W. Schulze.

Behavioral economics integrates psychology and economics by identifying systematic anomalies in decision-making. These are now recognized to be an important source of error in business decisions, and they provide the foundation for both behavioral marketing and finance. The course compares rational choice theory with behavior both in lecture and through a series of economics experiments in which students face situations that are likely to lead to anomalies such as "the winner's curse," the status quo bias, hyperbolic discounting, and bias in assessing risks. Students have the opportunity to evaluate their own decision-making.

AEM 4150 Price Analysis

Fall. 3 credits. Prerequisites: AEM 2100 or equivalent, ECON 3130 or PAM 2000 or equivalent. H. M. Kaiser.

Focuses on the analysis of supply and demand characteristics of commodities with particular attention to agricultural products. Pays special attention to empirical analysis. Includes institutional aspects of pricing, temporal and spatial price relationships, price forecasting, and the economic consequences of pricing decisions.

AEM 4170 Decision Models for Small and Large Businesses

Fall. 3 credits. Prerequisites: junior or senior standing (priority given to AEM majors); AEM 2100 or equivalent. No F lec in weeks labs are held. C. L. van Es.

Focuses on economic and statistical models of decision analysis and their applications in large and small business settings. Demonstrates how use of models can improve the decision-making process by helping the decision maker. Emphasizes the importance of sensitivity analysis and the need to combine both quantitative and qualitative considerations in decision making. Draws cases from small business scenarios, the public policy arena, and corporate settings. Lab sessions focus on implementing decision models with computers.

AEM 4180 Introduction to System Dynamics Modeling

Fall. 4 credits. Prerequisites: MATH 1106 or higher and upper-level standing or permission of instructor. C. Nicholson.

Introduction to concepts of system dynamics modeling, including the modeling process, fundamental modes of dynamic behavior and the stock-flow-feedback structures that generate them, system mapping tools, and modeling human behavior. Emphasis on examples from agriculture, natural resource management, and international development. Lab develops skills in the use of dynamic modeling software.

AEM 4190 Strategic Thinking

Spring. 3 credits. Prerequisite: PAM 2000 or ECON 3130. S-U or letter grades. N. H. Chau.

The art of thinking strategically puts outdoing one's adversary at the core of the decision-making process, while anticipating that the adversary is doing exactly the same thing. Businesses make investment decisions and innovate products in anticipation of the reaction of their rivals; managers make pay contingent on peer performance, taking into account the reaction of their subordinates and superiors; national trade policies are formulated based on whether trading partners are committed to make credible concessions. This course introduces and explores the use of game theory to understand these interactions; students are expected to work with a balanced dose of both theory and relevant case studies. The objective of the course is to facilitate students' ability to think strategically on firm level issues (e.g., pricing, advertising wars, product differentiation, and entry deterrence) and strategic policy interaction in international economic relations (e.g., trade wars and the arms race).

[AEM 4200 Investments]

[AEM 4210 Derivatives and Risk Management]

AEM 4220 Estate Planning (also NBA 5620)

Fall. 1 credit. Prerequisite: junior, senior, or graduate standing. S-U grades only. D. A. Grossman.

Fourteen sessions on the various aspects of estate planning techniques. Covers the law and use of trusts, the law of wills, federal and New York State estate and gift taxes, and substitutes for probate procedures.

AEM 4230 Contemporary Topics in Applied Finance

Fall. 3 credits. Prerequisites: ECON 1110, MATH 1110 or equivalent, AEM 2100 or equivalent, AEM 3240. Letter grades. V. Bogan.

Stimulates critical thinking about contemporary topics that attract attention in the press and among key finance decision-makers. This analytical course draws on the theory of modern finance to facilitate the understanding of real-world issues. Covers traditional topics in financial markets such as security trading, derivatives, fixed income, IPOs, portfolio formation, and market efficiency. Also explores newer issues such as technology and financial markets.

AEM 4240 Management Strategy

Fall and spring. 3 credits. Prerequisite: AEM seniors. Fall, G. Blalock; spring, D. Simon.

Capstone course designed to integrate what students have learned in other AEM courses with an emphasis on strategic decision making. Approaches issues from the standpoint of the board of directors, chief executive officer, and business unit managers. Focuses on what should be considered and how strategic decisions should be made.

AEM 4260 Fixed-Income Securities

Fall. 3 credits. Prerequisites: MATH 1110 or equivalent, AEM 2100 or equivalent, AEM 3240. Letter grades. V. Bogan.

This course focuses on fixed-income securities including corporate bonds, default-free bonds, and floating rate notes. Other topics include related financial instruments such as forwards and futures on fixed-income securities, interest rate swaps, bond options, and mortgage-backed securities. In addition to the analysis of specific types of fixed-income securities, there will be an examination of the tools used in bond portfolio management.

AEM 4270 Agribusiness Strategy

Fall. 3 credits. Prerequisite: AEM 1200 or 3020. B. Gloy.

Intended for students with an interest in agribusiness and designed to integrate previous course work and enhance problem identification and solving skills. Focuses on the evaluation, formulation, and implementation of strategy designed to create and sustain competitive advantage for agribusiness firms. Covers industry analysis, firm analysis, market analysis and selection, risk analysis, strategy development, organizational design and structure, and leadership for agribusiness firms. Designed as a capstone course for the agribusiness management specialization.

AEM 4280 Valuation of Capital Investment

Spring. 3 credits. Prerequisites: AEM 1200 and 3240 or equivalents. D. T.-C. Ng.

Focuses on the analysis of financial information—particularly firms' financial reports—for making decisions to invest in businesses. The primary focus is on equity (share) valuation, with some attention given to credit analysis. Examines various valuation models in detail and applies them in cases and projects involving listed companies. Topics include models of shareholder value, discounted cash flow approaches to valuation, the analysis of profitability, growth, and valuation generation in a firm, forecasting earnings and cash flows, proforma analysis for strategy and planning, analysis of risk, and the determination of price/earnings and market-to-book ratios.

AEM 4290 International Finance

Spring. 3 credits. Prerequisites: AEM 2100 and 3240. S-U or letter grades. D. T.-C. Ng.

Teaches students about issues in international financial management and international investment. The major issues discussed include exchange rate volatility, the benefit of international diversification, and the analysis of international capital budgeting decisions. Specific topics include the determination of the cost of capital for foreign investments, the determination and management of foreign exchange risks and country risks, and the use

of innovative financing for the multinational corporation.

AEM 4300 International Trade Policy

Spring. 3 credits. Prerequisites: ECON 1110–1120 or equivalents and intermediate microeconomics course. S–U or letter grades. N. H. Chau.

Examines the economic principles underlying international trade and monetary policy, and the policies, practices, and institutions that influence trade and foreign exchange markets. Also emphasizes applications to current topics in international trade policy, to trade in primary commodities, and to both developed and developing countries.

AEM 4310 Agricultural and Food Policy

Fall. 3 credits. Prerequisites: junior, senior, or graduate standing; PAM 2000, ECON 3010, 3130, or equivalent. S–U or letter grades. A. Novakovic.

Acquaints students with current and historically important U.S. policies related to agriculture and food, including subsidies and regulations related to markets, production, and the environment. The approach combines historical, political, and economic interpretation and analysis.

AEM 4320 Public Private Sector Economics Linkages

Spring. 3 credits. Prerequisite: intermediate microeconomics course. C. K. Ranney.

This course examines the role of government tax and expenditure policies in the United States using tools from microeconomic theory. Given that the government sector is almost 40 percent of total U.S. economic activity, we analyze two related questions: First, when and why should some economic activities be undertaken in the public rather than private sector? Second, what are the implications of governmental economic activity on private sector decision makers? An array of tax and expenditure policies are investigated with particular foci changing from year to year based on current events and student interests.

AEM 4350 Political Economy of the WTO

Spring. 3 credits. Prerequisite: intro microeconomics. H. deGorter.

The politics of the WTO and trade policy are explored. We examine what the WTO is, how it operates, how much power it really has, why it was created, incentives for governments to cooperate. How WTO rules affect domestic politics and foreign policy goals and how WTO rules and agreements are enforced. We also debate the effect of trade on growth and poverty.

AEM 4360 Entrepreneurial Leadership

Fall, weeks 7–14. 1 credit. Prerequisite: permission of instructor. D. Streeter.

Participants learn about concepts and practice skills important to becoming an entrepreneurial leader in startup or small business, corporate environment, and/or the public sector. Set in a global context, issues-related entrepreneurial leadership are covered: vision, opportunity identification, engagement of teams in resource-constrained situations, and tolerance for ambiguity and risk.

[AEM 4370 Innovation Strategy]

AEM 4420 Emerging Markets

Fall. 3 credits. Prerequisites: senior or graduate standing; AEM 2400 and PAM 2000 or ECON 3130. R. D. Christy.

Provides a framework for examining the effectiveness of marketing strategies in economies in transition and identifying the challenges and opportunities for firms in low-income economies to access industrial markets. Appraises the risk of entering markets in low-income economies and assesses the political, legal, cultural, and economic forces. Analyzes and discusses case studies of companies.

AEM 4430 Food-Industry Strategy

Fall. 2 credits. Prerequisite: AEM juniors, seniors, or graduate students; AEM 2400 or 4480; or permission of instructor. Staff.

Examines the decisions that businesses must make, such as what to sell, where to invest, when to outsource, and how to market—all in a changing and competitive environment. While the principles are applicable to any competitive environment, the focus is on one industry, the food industry, to allow an in-depth look at how the various players (manufacturers, retailers, and others) both cooperate and compete in the process of supplying food to consumers. Students learn how such issues as globalization, industry consolidation, new technologies, and health concerns add to their challenges and opportunities.

[AEM 4440 Managing for Market-Driven Growth]

Fall. 3 credits. Prerequisite: AEM 2400; junior or senior standing. Staff.

A sound marketing strategy is essential for the long-term success of a firm. This requires an understanding of how customer needs evolve, how product-market boundaries shift, and how competitors are likely to react. The strategic roles of existing and new products need to be assessed, appropriate resource allocations made, and strategies developed to ensure sustained growth. The course is designed to provide opportunities to learn about the theoretical and applied perspectives of marketing strategy from readings, case analyses, and guest speakers.]

AEM 4450 Food Policy for Developing Countries (also NS 4450) (SBA)

Fall. 3 credits. Prerequisites: 6 credits in economics, applied economics, or sociology and 6 credits in nutrition and/or agricultural sciences. P. Pinstrup-Andersen.

Comprehensive presentation and discussion of policy options for a sustainable global food system, with focus on developing countries. Topics include economic policy related to nutrition, health, consumption, production, natural resource management, trade, markets, gender roles, armed conflict, and ethics. A social entrepreneurship approach based on case studies and active participation by students will be used.

[AEM 4460 Food Marketing Colloquium]

AEM 4470 Retail Speaker Series

Spring. 1 credit. D. J. Perosio.

Seminars and guest lectures by faculty and guest lecturers engaged in the study and practice of retailing. This class provides a unique opportunity for successful industry leaders to share their experiences with Cornell students. Speakers share their view about successful management styles, possible

career paths, critical industry-related issues, and qualities conducive to successful business leadership. Students have an unprecedented opportunity to learn and question how retail leaders view the current and future status of retailing, the largest sector in the U.S. economy.

AEM 4480 Food Merchandising

Spring. 3 credits. Prerequisite: junior or senior standing; AEM 2400. D. J. Perosio.

Covers merchandising principles and practices as they apply to food industry situations. Examines the various elements of merchandising such as buying, pricing, advertising, promotion, display, store layout, profit planning and control, and merchandising strategy. Considers the consequences of food industry trends and initiatives for other industry members, public policy makers, and consumers.

AEM 4500 Resource Economics (also ECON 4500) (SBA)

Fall. 3 credits. Prerequisites: MATH 1110, ECON 3130, and familiarity with Excel. J. M. Conrad.

Constructs dynamic models of renewable, nonrenewable, and environmental resources to examine market allocation and optimal resource management.

AEM 4510 Environmental Economics (also ECON 4090) (SBA)

Spring. 3 credits. Prerequisites: undergraduate standing; intermediate microeconomics course and calculus. S–U or letter grades. Staff.

Explores the economic foundations for public decision making about environmental commodities and natural resources, using tools from intermediate microeconomics. Emphasizes the welfare economic approach for allocating public goods, with specific emphasis on market failure, externalities, benefit-cost analysis, nonmarket valuation techniques, and cost-effective policy instruments. Also examines property rights/institutional perspectives and ecological economic concepts.

AEM 4520 Accounting for Mergers and Acquisitions

Fall. 3 credits. Prerequisite: AEM 3360 Intermediate Accounting I. E. Lewis.

Detailed analytical study of special issues and situations in financial accounting. Continuous emphasis is placed on the relationship between theory and practice to reflect the latest professional pronouncements. Highly technical topics related to corporation, partnership, government, and not-for-profit organizations, with a focus on business combinations and the particular accounting challenges that they present.

AEM 4530 Risk Management, Internal Control and Assurance

Fall. 3 credits. Prerequisite: AEM 3360 Intermediate Accounting I. J. Lippitt.

Theory and practice of independent examination of financial statements. Discussion of relationships with clients; working papers, assurance procedures, including evaluations of internal controls; accounting principles; risk assessment; liability and professional ethics.

AEM 4540 China's and India's Growth Miracles (also ECON 4540)

Fall. 2 or 3 credits. Prerequisites: basic course in macroeconomics, international economics, and econometrics/statistics. E. Prasad.

This is an advanced undergraduate course that will cover topics in international finance and open economy macroeconomics. The course will be organized around a detailed examination of the growth experiences of China and India as a device for illustrating and delving into key analytical concepts.

AEM 4620 Technology and Financial Markets

Fall. 2 credits. Prerequisites: AEM 3240 and one 4000-level AEM finance course; permission of instructor. V. Bogan.

The course focuses on issues involving technology and financial markets. It is designed to equip future finance professionals with the knowledge of key finance systems (Bloomberg) skills and technologies. The lectures and labs will teach students to apply their theoretical finance knowledge in real-world situations for the purpose of optimizing their future job performance and increase their marketability. Lectures will explore topics on the effects of technology on financial markets. The lab component of the course will require students to complete the 30-hour, self-paced Bloomberg certification process.

AEM 4640 Economics of Agricultural Development (also ECON 4640)

Fall. 3 credits. Prerequisite: ECON 1110-1120 or permission of instructor. R. D. Christy.

Provides an understanding of the economics of the agricultural sector in low-income countries. Also covers more general issues of economic development beyond the agricultural sector to provide the necessary context for an understanding of rural problems. Topics include the nature of development and technical change, welfare and income distribution, land reform, food and nutrition policy, food security and food aid, competition with more developed countries and international markets, the effect of U.S. policy on agricultural development, and the role of international institutions. Uses examples from a wide variety of developing countries to illustrate the basis for economic analysis.

AEM 4940 Undergraduate Special Topics in Applied Economics and Management

Fall or spring. 4 credits max. S-U or letter grades. Staff.

The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the beginning of the semester.

AEM 4970 Individual Study in Applied Economics and Management

Fall or spring. Variable credit. S-U or letter grades. Students must register using independent study form (available in undergraduate program office in Warren Hall). Staff.

Used for special projects designed by faculty members.

AEM 4980 Supervised Teaching Experience

Fall or spring. 1-4 credits. Students must register using independent study form (available in undergraduate program office in Warren Hall). Staff.

Designed to give qualified undergraduates experience through actual involvement in planning and teaching courses under the supervision of department faculty. Students cannot receive both pay and credit for the same hours of preparation and teaching.

AEM 4990 Undergraduate Research

Fall, spring, or summer. 1-4 credits. Prerequisite: GPA of at least 2.7. Students must register using independent study form (available in undergraduate program office in Warren Hall). S-U or letter grades. Staff.

Permits outstanding undergraduates to carry out independent study of suitable problems under appropriate supervision. Students cannot receive both pay and credit for the same hours of work.

AEM 4991 Independent Honors Research in Social Science

Fall or spring. 1-6 credits. Prerequisite: requirements for honors program met (see "Honors Program" under CALS).

Provides qualified students an opportunity to conduct original research under supervision. Information is available in the AEM undergraduate program office in Warren Hall.

AEM 6050 Agricultural Finance

Fall. 3 credits. Prerequisite: AEM 3240 or 4050 or equivalent B. A. Gloy.

Covers advanced topics in agricultural finance, including investment analysis, capital budgeting under uncertainty, decision analysis, risk management, capital structure, and financial intermediaries.

AEM 6080 Production Economics (also ECON 4080)

Fall. 3 credits. Prerequisite: ECON 3130 and MATH 1110 or equivalents. R. Boisvert.

Studies the theory of production economics with emphasis on applications to agriculture and natural resources. Topics include the derivation, estimation, and use of production, cost, profit, revenue, demand, and supply functions. Discusses the concepts of efficiency and productivity. Introduces production response over time and under risk.

AEM 6120 Applied Econometrics

Fall. 1 credit. Corequisite: AEM 4110. D. Just.

Designed for M.S. and Ph.D. students who do not meet the prerequisites for other graduate-level econometrics courses. Complements AEM 4110, providing greater depth of understanding of econometric methods and exposure to applied econometric literature. Focuses on preparing students to conduct their own applied economic research.

AEM 6180 System Dynamics Applications

Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. C. Nicholson.

This course provides more detailed discussion of SD concepts and further develops skills in system dynamics modeling through application to a project chosen by the student. Iterative writing assignments and peer review are used to refine problem

statements, causal hypotheses, simulation models, model evaluation, and policy analysis. Final project includes development and application of a simulation model.

AEM 6300 Policy Analysis: Welfare Theory, Agriculture, and Trade (also ECON 4300)

Spring. 4 credits. Prerequisites: AEM 6080 or PAM 6030, ECON 3130, or equivalent intermediate micro theory course incorporating calculus. H. de Gorter.

The first half of the course surveys the theory of welfare economics as a foundation for public policy analysis. Major issues addressed include the problem of social welfare measurement, the choice of welfare criteria, and the choice of market or nonmarket allocation. Basic concepts covered include measurement of welfare change, including the compensation principle, consumer and producer surplus, willingness-to-pay measures, externalities, and the general theory of second-best optima. The second half focuses on public policy analysis as applied to domestic agricultural policy and international trade. The domestic policy component examines major U.S. farm commodity programs and related food and macroeconomic policies and analyzes their effects on producers, consumers, and other groups. The international trade component examines the structure of world agricultural trade, analytical concepts of trade policy analysis, and the principal trade policies employed by countries in international markets.

AEM 6320 Open Economy Analysis: Theory and Applications

Spring. 2 credits. Prerequisites: ECON 3130/3140 or permission of instructor. S-U or letter grades. N. Chau.

Explores both recent theoretical and methodological advances as well as practical applications in analyzing current topics and issues in open economies. Brings together research methods pertinent to open economy macroeconomics and international trade policies to give students a basic understanding of how different aspects of contemporary debates are analyzed in practice.

AEM 6400 Analysis of Agricultural Markets (also ECON 4400)

Fall. 3 credits. Prerequisites: AEM 4110 and 4150 or equivalents. Offered even-numbered years. H. M. Kaiser.

Focuses on the unique features of agricultural commodity markets. Emphasizes government and private institutions that affect these markets, as well as on models of price behavior including marketing margins and imperfect competition. Also covers empirical tools to evaluate market characteristics.

AEM 6410 Commodity Futures Markets

Spring, weeks 8-14. 2 credits. Prerequisites: AEM 4110 and 4150 or equivalents. Recommended: AEM 6400. W. G. Tomek.

Focuses on markets for agricultural futures contracts. Emphasizes models of price behavior on futures markets including relationships among cash and futures prices. These principles provide a foundation for a discussion of hedging, speculation, and public policy issues.

AEM 6420 Globalization, Food Safety, and Nutrition (also NS 6420)

Fall. 2 credits. Prerequisites: permission of instructor, graduate standing, and basic understanding of economics and nutrition. Letter grades only. P. Pinstруп-Andersen.

Directed readings course with a weekly 50-minute discussion session. The course is aimed at graduate students in nutrition, agricultural economics, and other relevant fields, who wish to explore how globalization may affect poverty, food security, and nutrition in developing countries and how national policies and international agreements and institutions may influence the outcome. The discussion sessions are based on assigned readings for each week.

AEM 6510 Environmental and Resource Economics

Spring. 4 credits. Core course for environmental management concentration/option. Prerequisite: graduate standing. Open to graduate students outside economics. G. L. Poe.

Review of welfare economics, environmental externalities, and common property resources, and a survey of current environmental and natural resource policy. Covers techniques for measuring benefits and costs—including property value and wage hedonic approaches, travel cost models, and contingent evaluation. Describes survey/data collection methods in detail. Explores innovative market mechanisms for resolving public good, common property, and externality problems. Students are required to complete a paper describing their own formal economic analysis of a natural resource or environmental problem.

AEM 6550 Electric Systems Engineering and Economics (also ECE 5510)

Fall. 2 credits. Prerequisites: basic calculus and microeconomics courses. T. D. Mount. For description, see ECE 5510.

AEM 6600 Agroecosystems, Economic Development, and the Environment

Spring. 3–4 credits. Prerequisite: graduate standing. Open to graduate students outside economics; additional sec TBA for economics majors. S–U or letter grades. D. R. Lee.

Examines selected topics in agricultural and economic development, technology assessment, ecosystem management and the environment, with a focus on developing countries. Topics include production, poverty, and environmental tradeoffs; sustainable technology development; trade and environment linkages; economics of conservation and development; and alternative methodologies for analyzing these interactions. Readings emphasize the economic literature, but also draw from the biophysical sciences, ecosystem management, and the broader social sciences.

AEM 6670 Topics in Economic Development (also ECON 7770)

Spring. 3 credits. Targeted to second- and third-year graduate students. Prerequisite: basic first-year courses in ECON or AEM or permission of instructor. S–U or letter grades. R. Kanbur.

Topics vary from year to year but may include poverty, inequality, intra-household allocation, structural adjustment, and debt. Examination is by term paper.

[AEM 6700 Economics of Consumer Demand (also PAM 6080)]

Fall. 3 credits. Prerequisites: ECON 3110 or 3130 and two semesters of calculus. S–U or letter grades. Next offered 2009–2010. C. K. Ranney.

Graduate-level introduction to theory and empirical research on household demand, consumption, and saving. Emphasizes the use of the theory in empirical research. Topics include neoclassical theory of demand, duality, complete demand systems, conditional demand, demographic scaling and translating, consumption, and savings. As time allows, Becker and Lancaster models of demand may be introduced.]

AEM 6840 Economics of Biofuels: Implications for the Nexus of Agricultural, Energy, and Environmental Policies

Fall. 2 to 3 credits. Prerequisite: knowledge of microeconomics. S–U or letter grades. H. deGorter.

Topics include feedstock–biofuel–oil price linkages, profitability, tax credits versus mandates, sub-optimal environmental and energy policies, policy interactions, international trade models, import tariffs, ‘subsidy’ component of biofuel policies and the WTO, life-cycle accounting and sustainability standards, developing countries and poverty, food-versus-fuel debate, and implications for technology and farm subsidies.

AEM 6900 Biofuels: The Economic and Environmental Interactions (also BEE 4900)

Spring. 2 credits. Prerequisites: senior or graduate standing, others by permission of instructor. S–U or letter grades. P. G. Hess. For description, see BEE 4900.

AEM 6940 Graduate Special Topics in Applied Economics and Management

Fall or spring. 4 credits max. S–U or letter grades. Staff.

The department teaches “trial” courses under this number. Offerings vary by semester and are advertised by the department before the beginning of the semester.

AEM 6980 Supervised Graduate Teaching Experience

Fall or spring. 1–4 credits; max. 4 credits during graduate program. Prerequisite: graduate standing; permission of instructor. Undergraduates should enroll in AEM 4980. Students must register using independent study form (available in undergraduate program office in Warren Hall). S–U or letter grades. Staff.

Designed to give graduate students teaching experience through involvement in planning and teaching courses under the supervision of departmental faculty members. The experience may include leading discussion sections, preparing, assisting in, or teaching lectures and laboratories, and tutoring. Students are expected to actually teach at least one hour per week for each credit awarded. Students may not receive both pay and credit for the same hours of preparation and teaching.

AEM 6990 M.P.S. Research

1–6 credits. Prerequisite: M.P.S. students. Credit granted for M.P.S. project report. Staff.

AEM 7000 Individual Study in Applied Economics and Management

Fall or spring. Prerequisite: graduate standing. S–U or letter grades. Credit, class hours, and other details TBA with faculty member. Staff.

Used for special projects designed by faculty members. More than one topic may be given each semester in different sections. Student must register in section appropriate to topic being covered; section number is provided by instructor.

AEM 7010 Applied Microeconomics I

Fall. 3 credits. Required for all second-year AEM Ph.D. students. Prerequisites: Ph.D. students only; ECON 6090 and 6100, and AEM 7100 or equivalent. W. D. Schulze and R. N. Boisvert.

This course covers economic models and empirical applications in consumer demand and production economics.

AEM 7020 Applied Microeconomics II

Spring. 3 credits. Required for all second-year AEM Ph.D. students. Prerequisites: Ph.D. students only; ECON 6090 and 6100, and AEM 7100 or equivalent. H. DeGorter, D. R. Just, and J. Prince.

This course covers economic models and empirical applications in welfare economics, risk analysis and industrial organization.

[AEM 7080 Advanced Production Economics]**AEM 7100 Econometrics I**

Spring. 3 credits. Prerequisites: matrix algebra and statistical methods courses at level of ILRST 3110 or ECON 6190. T. D. Mount.

Provides (together with AEM 7110) a graduate sequence in applied econometrics that is suitable for M.S. and Ph.D. students. Covers linear-regression models and the associated estimation and testing procedures.

AEM 7110 Econometrics II

Fall. 3 credits. Prerequisite: AEM 7100 or equivalent. T. D. Mount.

Coverage beyond AEM 7100 of dynamic models, including single-equation ARIMA, vector ARIMA, Kalman filtering, structural dynamic models, and regime switching. Topics include endogeneity, stability, causality, and cointegration.

AEM 7120 Quantitative Methods I

Fall. 4 credits. Prerequisite: some formal training in matrix algebra. Highly recommended: course at level of BTRY 4170. R. N. Boisvert.

Comprehensive treatment of linear programming and its extensions, including postoptimality analysis. Topics include nonlinear programming, including separable, spatial equilibrium, and risk programming models. Discusses input-output models and their role in social accounting matrices and computable general equilibrium models. Makes applications to agricultural, resource, and regional economic problems.

AEM 7130 Dynamic Optimization

Spring. 3 credits. Prerequisite: ECON 6090 and ECON 6170. Letter grades only. J. M. Conrad.

Concerned with the solution of dynamic allocation problems. Objectives are to (1) pose prototype optimization problems in discrete and continuous time, (2) introduce the common methods for solving prototype problems, (3) present a set of numerical problems, and thereby (4) equip students

with basic theory and methods to perform applied research on dynamic allocation problems.

AEM 7140 Experimental Economics

Fall. 4 credits. Prerequisite: ECON 6090.
Offered alternate years. W. D. Schulze.
Surveys both experimental economics methods and research as an approach to test economic theory. Students participate as subjects in a series of illustrative computerized experiments ranging from double auctions to public goods provision. Topics include experimental methods; decisions and games; markets (testing auction institutions); market power (monopoly, oligopoly); bargaining, compensation, and performance; public goods; externalities and voting; information and uncertainty; and economic anomalies. Students must design and write a paper describing their own experiment.

AEM 7170 Research Methods in Agricultural Economics

Spring. 2 credits. Prerequisite: graduate standing. R. N. Boisvert.
Discusses the research process and scientific method as applied in agricultural economics. Topics include problem identification, hypotheses, sources of data, sampling concepts and designs, methods of collecting data, questionnaire design and testing, field organization, and analysis of data. During the semester, each student develops a research proposal that may be associated with his or her thesis.

AEM 7300 Seminar on International Trade Policy: Agriculture, Resources and Development

Spring. 3 credits. Prerequisite: graduate standing; AEM 6300 or equivalent.
D. R. Lee.
Examines selected topics in the professional literature on international trade policy, focusing on agricultural trade and related topics, including trade liberalization, trade and environmental linkages, technological change and trade policy, and agricultural trade and development.

AEM 7350 Public Finance: Resource Allocation and Fiscal Policy (also ECON 7350)

Spring. 4 credits. Prerequisite: ECON 6090.
R. Kanbur.
For description, see ECON 7350.

AEM 7400 Empirical Analysis of Industrial Organization

Spring. 3 credits. Prerequisites: ECON 6090, ECON 6100, and AEM 7100.
J. Prince.
This course will analyze in detail leading papers in the empirical industrial organization (IO) literature. In doing so, the objective will be to develop students' skills in determining appropriate theoretical and corresponding econometric models for applied research, and to improve students' proficiencies with a variety of econometric models (e.g., OLS, IVs, MLE, GMM, discrete choice).

AEM 7440 Advanced Consumer Research

Fall. 3 credits. Prerequisite: graduate standing; priority given to CALS Ph.D. students, especially in AEM, nutritional science, or food technology. B. Wansink.
Workshop providing students with a unique opportunity to develop an advanced theory-based understanding of consumers by using

innovative methods and new research techniques. Class sessions alternate theory with implementation.

AEM 7500 Resource Economics

Fall. 3 credits. Prerequisites: ECON 6090 and 6180, or AEM 7130. J. M. Conrad.
Uses optimal control and other methods of dynamic optimization to study the allocation and management of natural resources.

AEM 7510 Environmental Economics

Spring. 4 credits. Prerequisites: ECON 6090 and graduate-level econometrics course. S-U or letter grades. G. L. Poe.
The objective of this course is to provide a graduate-level survey of the two prevailing contemporary themes in environmental economics: the measurement of the demand for environmental resources as input into benefit-cost analyses, and the design of incentive-based, cost-effective policy instruments to achieve environmental goals. Core topics include market failure, conceptual foundations for valuing changes in environmental quality, empirical applications of nonmarket valuation methods, and cost-effective market mechanism design for reducing pollution. Additional topics include information asymmetries and mechanism design for nonpoint source pollution, and international/global environmental issues.

[AEM 7620 Microeconomics of International Development

Fall. 3 credits. Prerequisite: completion of first-year Ph.D. course sequence in AEM or ECON or permission of instructor. S-U or letter grades. Offered even years; next offered 2010-2011. C. B. Barrett.
Focuses on models of individual, household, firm/farm, and market behavior in low- and middle-income developing economies. Topics include agricultural land, labor, and financial institutions; technology adoption; food security and nutrition; risk management; intra-household analysis; reciprocity networks; and product/factor markets analysis. Emphasizes empirical research.]

AEM 7650 Development Microeconomics Graduate Research Seminar

Spring and fall. 1-3 credits. Prerequisite: graduate standing and permission of instructor. C. B. Barrett.
Graduate students and the instructor present draft research proposals, papers, and preliminary thesis results for group review and discussion. Students who actively participate by offering written and oral comments on others' work receive 1 credit. Students who also present their own proposal or paper receive 2 credits. Presentations last 75 minutes and thus represent a substantial investment of time. Students who present a second proposal or paper receive 3 credits.

AEM 7670 Topics in International Finance

Fall. 3 credits. Prerequisite: ECON 7620 or equivalent. E. Prasad.
This course will provide a selective overview of topics at the cutting edge of academic research and policy debates about the international financial system. Main areas will include the effects of financial globalization on growth, volatility, and the transmission of business cycles. We will also examine the determinants of the direction and composition of capital flows, and analyze the implications of the rising prominence of

hedge funds, sovereign wealth funds, and other institutional investors. This course is intended for advanced Ph.D. students, especially those in search of thesis topics, and will require extensive student involvement in preparing research proposals and critiques of existing literature.

AEM 7900 Graduate-Level Thesis Research

Fall or spring. 1-9 credits. Prerequisite: permission of graduate committee chair. For Ph.D. students only **before** "A" exam has been passed. S-U grades only. Graduate faculty.

AEM 8900 Master's-Level Thesis Research

Fall or spring. 1-9 credits. Prerequisite: permission of graduate committee chair. S-U grades only. Graduate faculty. For students admitted specifically to a master's program.

AEM 9900 Doctoral-Level Thesis Research

Fall or spring. 1-9 credits. Prerequisite: permission of graduate committee chair. S-U grades only. Graduate faculty. For Ph.D. students only **before** "A" exam has been passed.

ANIMAL SCIENCE

W. R. Butler, chair (149 Morrison Hall, 255-2862); R. E. Austic, D. E. Bauman, Y. R. Boisclair, S. A. Brooks, D. L. Brown, L. E. Chase, D. J. R. Cherney, W. B. Currie, H. N. Erb, D. M. Galton, J. Gavalchin, I. Imumorin, P. A. Johnson, Q. M. Ketterings, X. G. Lei, Q. M. Long, T. R. Overton, J. E. Parks, A. N. Pell, E. J. Pollak, R. L. Quaas, S. M. Quirk, R. D. Smith, M. L. Thonney, M. E. Van Amburgh

[ANSC 1100 Domestic Animal Biology I

Fall. 4 credits. S-U or letter grades. Staff.
Introduction to the biology of economically important species (morphology, anatomy, and physiology) and its application to the management of animals in major livestock industries. Topics include domestication and origins of animal science, anatomy, quantitative cell biology, regulatory mechanisms, public domain genetic databases, major life support systems, and digestion. Students undertake the care and management of several species of farm animals. Laboratory exercises include animal handling, examining aspects of anatomy, and small group discussions of contemporary biotechnologies. Living farm animals are used noninvasively, and fresh organs from dead animals are examined.]

ANSC 1105 Contemporary Perspectives of Animal Science

Spring. 1 credit. Prerequisite: freshmen, sophomores, or first-year transfer standing. J. Gavalchin.
A forum to discuss the students' career planning and the contemporary and future role of animals in relation to human needs.

ANSC 1120 Sustainable Animal Husbandry

Summer. 3 credits. S–U or letter grades. D. L. Brown.

Students completing this course will understand the many roles of domestic animals and the importance of their interdependence with humans; appreciate the scope, diversity, and problems related to domestic animal systems; be able to design and operate simple sustainable animal systems; and know how to continue learning about sustainable animal systems. This intensive summer course includes 25 hours of lecture and 39 hours of hands-on laboratory/demonstrations at various field sites and facilities all within a three-week period. Topics include domestication, sustainability, dogs, cats, rabbits, sheep, genetics, swine, nutrition, beef cattle, grazing, dairy cattle, dairy products, goats, poultry, aquaculture, camelids, horses, draft animals, animal systems modeling, Third World limited-resource animal systems, toxicology, lab animals, toxicology, veterinary medicine, and ethics of human interactions with domestic animals.

ANSC 1160 Animal Agriculture and Society—From Food to Medicine

Fall. 4 credits. Letter grades only. D. L. Brown, J. R. Giles, X. Lei, and M. E. Van Amburgh.

The course is designed to integrate concepts of physiology, immunology, growth biology, lactation, and pregnancy with current production systems, cultural and societal aspects of animal food production and use, and the current economic forces driving some of the production system evolution. The course is intended for majors and nonmajors with an emphasis on integrating animal biology with our current production and food systems from an Animal Science perspective. Topics include Domestication, Pre-technology Agriculture, Production Systems and Economics, Food Systems and Safety, Environmental Issues and Perspectives, Animal-Derived Food in Human Health, and Use of Animals in Biomedicine.

ANSC 2120 Animal Nutrition

Fall. 4 credits. Prerequisite: CHEM 2080 or equivalent. Recommended: ANSC 1100 and 1160. D. J. R. Cherney.

Introduction to animal nutrition, including digestive physiology and metabolism of domestic animals and other species; nutrient properties and requirements for different aspects of animal production and performance; principles of feed evaluation and ration formulation. Laboratory classes include gastrointestinal tract dissections and nutritional experiments performed on laboratory or farm animal species.

ANSC 2140 Captive Raptor Management and Propagation

Summer. 3 credits. Prerequisites: high school chemistry and biology. J. E. Parks.

This course is an introduction to the natural history and the care and management of raptors (birds of prey). Approaches to captive care and maintenance, restraint, training, and captive breeding with potential for reducing pressures on wild populations of avian species will be included. A major objective is to present and discuss the scientific basis and merit of avian husbandry and breeding practices in species relevant to the course.

Hands-on opportunities in basic raptor handling techniques are included.

ANSC 2150 Exotic Avian Husbandry and Propagation

Fall. 2 credits. Prerequisite: ANSC 1100, 1160, or one year introductory biology.

J. Parks and D. Muscarella.

Natural history, care, management, health, and breeding of exotic avian species with emphasis on psittacines (parrots and related species) and raptors (birds of prey). Includes lectures, demonstrations, and local field trips.

ANSC 2210 Introductory Animal Genetics

Spring. 3 credits. Prerequisite: one year of college biology. I. Imumorin.

Examination of basic genetic principles and their application to the improvement of domestic animals, with emphasis on the effects of selection on animal populations.

ANSC 2250 Fertilization and New Life Technologies

Summer 3 credits. Prerequisite: high school biology. J. E. Parks.

Course covers the biology of fertilization in mammals and birds including production of gametes (sperm and ova), the physiological events required for fertilization *in vivo*, early embryo development, and associated reproductive technologies (in vitro fertilization, intracytoplasmic sperm injection, cloning, cryopreservation, etc.).

ANSC 2400 Animal Reproduction and Development

Spring. 3 credits. Prerequisite: one year introductory biology. J. E. Parks.

Comparative anatomy and physiology of mammalian and avian reproduction, with emphasis on domestic and laboratory animals; fertilization through embryonic development, pregnancy, and growth to sexual maturity; emphasis on physiological mechanisms and application to fertility regulation. Separate laboratory is offered to demonstrate fundamental aspects of reproduction and reproductive technology.

ANSC 2410 Animal Reproduction and Development Lab

Spring. 1 credit. Limited to 30 students per lab. Pre- or corequisite: ANSC 2400.

J. E. Parks.

Demonstrates fundamental principles and applied aspects of mammalian and avian reproduction. A limited number of live animals are used in some demonstrations. Dissection and examination of tissues from vertebrate animals are included in selected laboratories.

ANSC 2500 Dairy Cattle Principles

Fall. 3 credits. Prerequisite for ANSC 2510, 3510, 3540, and 3550. S–U or letter grades. D. M. Galton.

Introduction to the background and scientific principles relating to dairy cattle production. Laboratories are designed to provide an understanding of dairy cattle production.

ANSC 2510 Applied Dairy Cattle Genetics

Spring. 2 credits. Prerequisite: ANSC 2500. S–U or letter grades. D. M. Galton.

Application of scientific principles of genetic programs in herds with different breeding programs. Emphasizes economical traits to be used to improve genetic progress and herd performance.

ANSC 2650 Equine Biology and Management

Fall. 3 credits. Prerequisites: ANSC 1100 and 1160 or permission of instructor. S–U or letter grades. S. A. Brooks.

This course is designed to provide the basics of equine form, function, care, management, and handling. Students will learn the basic biology of the horse and how to apply this knowledge to solve problems in horse care. Hands-on labs will include safe handling techniques, basic groundwork, and daily care of class horses. Short trips and tours will illustrate applied concepts in horse industry and health care.

[ANSC 2900 Meat Science (also FDSC 2900)]

Fall. 2 credits. D. Shaw.

Introduction to meat science through a study of the structure, composition, and function of muscle and its conversion to meat. Also study properties of fresh and processed meat, microbiology, preservation, nutritive value, inspection, and sanitation.]

ANSC 3100 Introduction to Animal Welfare

Fall. 2 credits. S–U or letter grades. Staff.

Animal welfare issues will be discussed, mainly for farm animals, but companion animals will also be considered. Both animal specific and general areas of animal welfare will be discussed.

ANSC 3200 Comparative Animal Nutrition and Toxicology: Horses, Dogs, Cats, and More

Spring. 4 credits. Suggested prerequisites: one year college biology and ANSC 2120 Animal Nutrition or equivalent. S–U or letter grades. One weekend field trip. D. Brown.

At the end of this course, students will (1) be able to match feed resources to the physiological needs of horses, dogs, cats, rabbits, deer, reindeer, birds, reptiles, and a variety of other animals found at home, in zoos, rehabilitation centers, on ranches and farms, (2) understand the intellectual processes by which a successful, science-based feeding strategy should be developed for animals without a history of domestication, (3) understand the evolutionary and physiological basis for some of the diversity in nutritional strategies and toxicological vulnerabilities found among animals.

ANSC 3410 Biology of Lactation

Spring. 2 credits. Prerequisites: ANSC 1100–1160 or animal physiology course. Y. R. Boisclair.

Comprehensive survey of the biology of the mammary gland. Lectures cover (1) basic aspects such as anatomy and development of the mammary gland, biochemistry and hormone regulation of milk synthesis and regulation of gene expression in the mammary cells; (2) practical aspects such as the impact of lactation on nutrition, reproduction, and diseases. Information used comes from a variety of species, including the mouse for developmental aspects, the dairy cow for production aspects, and the human for health issues.

ANSC 3510 Dairy Herd Management

Spring. 4 credits. Prerequisite: ANSC 2500 or permission of instructor. Recommended: AEM 3020. D. M. Galton.

Application of scientific principles to practical herd management with components of reproduction, milking, housing, records, and production economics. Laboratories emphasize practical applications, analyses of alternatives, decision making, field trips, and discussion.

ANSC 3540 Dairy Cattle Herd Health

Fall. 3 credits. Prerequisite: ANSC 2500 or permission of instructor. S-U or letter grades. T. R. Overton.

Application of scientific principles to practical herd management with emphasis on herd health and animal well-being. Laboratory emphasizes practical applications of herd health management.

ANSC 3550 Dairy Cattle Nutrition

Spring. 3 credits. Prerequisite: ANSC 2500 or permission of instructor. Letter grades only. T. R. Overton and L. E. Chase.

Application of scientific principles to practical herd nutrition relating to herd production and feeding management. Laboratory emphasizes practical applications and field trips.

ANSC 3600 Beef Cattle

Spring. 3 credits. Offered even-numbered years. M. L. Thonney.

Emphasizes the management of reproduction, nutrition, and selection in beef cattle enterprises. Laboratories acquaint students with management skills through computerized simulations and working with cattle.

ANSC 3700 Immunology in Animal Health and Disease

Spring. 2 credits. Prerequisite: introductory biology. S-U or letter grades. J. Gavalchin. Course covers basic immunological concepts, including inflammation, and mechanisms of innate and acquired immunity. Focus will be on diseases of companion animals and livestock. Topics include pathogenetic mechanisms, immunodiagnostics, therapeutics, and vaccine development.

[ANSC 3800 Sheep

Spring. 3 credits. Offered odd-numbered years; next offered 2010-2011. M. L. Thonney.

Emphasizes breeding, feeding, management, and selection of sheep from a production-system approach. Lec/labs offer practical knowledge and scientific background for improved management practices.]

ANSC 3920 Mechanisms of Animal Growth and Development

Spring. 2 credits. Prerequisites: ANSC 1100-1160 or equivalent introductory physiology courses. Letter grades only. Q. Long and Y. Boisclair.

A course on the basic biology of animal growth and development. The course employs model systems (cell culture, fish, and mice) to examine cellular and molecular mechanisms of animal growth and development, and farm animals to discuss whole-animal growth patterns and applications of new technologies. Lectures cover (1) patterns of whole-animal growth during fetal and postnatal life; (2) molecular and cellular basis of formation and development of skeletal muscle, adipose tissue, and bone; (3) regulation of growth and development by hormones and growth factors; (4) emerging molecular technologies and whole-genome approaches for improving growth and meat quality.

[ANSC 3980 Animals in Biomedical Research

Fall. 2 credits. Prerequisites: one year introductory biology; ANSC 1100 or equivalent introductory physiology course. Offered alternate years; next offered 2010-2011. Letter grades only. X. Lei.

This course introduces features and applications of various animal models for biomedical research on human health, diseases, and nutritional deficiencies.]

ANSC 4010 Dairy Production Seminar

Spring. 1 credit. Prerequisite: junior or senior standing. T. R. Overton.

Capstone course in which students, with the help of faculty members, complete a study of the research literature on topics of current interest in the dairy industry. Students then make an oral and a written report on their topic with emphasis on integrating theory and practice.

ANSC 4020 Seminar in Animal Sciences

Spring. 1 credit. Prerequisite: students engaged in undergraduate honors research projects. S-U or letter grades. S. Quirk.

Reports of undergraduate honors research projects. Students present oral reports of their work for class discussion.

ANSC 4050 Molecular and Cellular Approaches to Reproductive Physiology

Fall. 3 credits. Prerequisites: one year introductory biology and introductory physiology (ANSC 1100 and ANSC 2400 or BIOAP 3110) or equivalent. S. Quirk.

Lectures on selected topics in reproductive biology of male and female mammals with a focus on how research questions are formulated, addressed and influenced by previous discoveries. Concepts introduced apply to investigation of all areas of animal physiology. Laboratory exercises provide experience in cellular and molecular methods used to study reproductive function.

[ANSC 4100 Nutritional Physiology and Metabolism

Fall. 3 credits. Prerequisites: biochemistry and physiology courses. Next offered 2010-2011. Staff.

Fundamental approach to nutrition focusing on the metabolic fate of nutrients and the interrelationships among nutrients, nutritional state, and metabolic processes. The overall goal is to increase understanding of metabolism and metabolic regulation through an integration of nutrition, biochemistry, and physiology.]

ANSC 4110 Integrated Cattle Nutrition

Fall. 4 credits. Designed for juniors, seniors, and entering graduate students. Prerequisites: ANSC 1100 and 2120 (or equivalent). Highly recommended: ANSC 3550. M. E. Van Amburgh.

Integrates concepts of cattle nutrition and farm nutritional management to help students understand and appreciate factors influencing the performance of cattle under diverse conditions. Topics covered include the effect of environment on maintenance costs; the nutrient requirements for various stages of growth, lactation, and pregnancy; rumen function, feed composition and chemistry, nutrient partitioning and the environmental impacts of cattle and how to minimize them. Computer models (Cornell Net Carbohydrate and Protein System) are used in the laboratory to actualize the information presented in lectures. Herd case studies are

used in lab and there are field trips to farms to evaluate the nutritional management.

ANSC 4120 Whole-Farm Nutrient Management (also CSS 4120)

Spring. 4 credits. Prerequisite: junior, senior, or graduate standing; ANSC 4110 preferred but not required. M. E. Van Amburgh and Q. M. Ketterings.

This course provides students with an understanding of the concepts and practices underlying whole-farm nutrient management planning of livestock and dairy farms. Improving profitability and efficiency are key factors considered while improving air and water quality associated with dairy production. Students learn about nutrient management on Confined Animal Feeding Operations (CAFO's) and conduct their own Comprehensive Nutrient Management Plan on a case-study farm. This course integrates crop and manure management with nutrition and herd management to provide a broad but focused and action-oriented approach. The course utilizes two software programs developed at Cornell for nutrient management planning and herd nutritional management, the Cornell Nutrient Management Planning System and the Cornell Net Carbohydrate and Protein System. Current topics are also discussed, such as greenhouse gas emissions and impacts of dairy and livestock production and local versus global food production and environmental impacts.

ANSC 4140 Ethics and Animal Science

Spring. 2 credits. Prerequisite: junior or senior standing. D. J. R. Cherney.

Explores the place of humans in the biological world, origins of ethics and morality, speciesism, the use of animals for research and agricultural purposes, transgenic animals. A book review, participation in discussion in class and online, and a project of the student's choice are used to evaluate the performance of each student.

ANSC 4250 Gamete Physiology and Fertilization (also BIOAP 4250)

Fall. 2 credits. Limited to 50 students. Prerequisite: ANSC 2400 or equivalent. Offered alternate years. J. E. Parks.

Study of the formation, growth, differentiation, and maturation of mammalian sperm and oocytes; gamete transport and interaction with male and female reproductive tracts; and cytological, physiological, and molecular changes required for fertilization. Lecture, discussion, and aspects of gamete physiology and in vitro technologies such as cryopreservation, oocyte maturation, and fertilization are covered.

ANSC 4270 Fundamentals of Endocrinology (also BIOAP 4270)

Fall. 3 credits. Prerequisite: animal or human physiology course or permission of instructor. P. A. Johnson.

Physiology and regulation of endocrine secretions. Emphasizes neuroendocrine, reproductive, growth, and metabolic aspects of endocrinology. Examples are selected from many animals, including humans.

ANSC 4510 Dairy Herd Business Management

Fall. 3 credits. Corequisite: ANSC 4560. J. Karszes and D. M. Galton.

Emphasizes dairy herd business management with application to herd management analysis. Laboratory includes farm tours and analysis.

ANSC 4560 Dairy Management Fellowship

Spring. 2 credits. Prerequisites: senior standing; ANSC 3510; permission of instructor. S–U grades only. D. M. Galton. Designed for undergraduates who have a sincere interest in dairy farm management. Objective is to gain further understanding of the integration and application of dairy farm management principles and programs with respect to progressive dairying and related industries.

ANSC 4570 Introductory Spanish for Dairy Producers

Spring. 3 credits. Prerequisite: ANSC 2500 or permission of instructor. S–U or letter grades. Staff.

Students with a focus on dairy management learn to communicate with the increasingly Spanish-speaking workforce to assure that the knowledge of cutting-edge dairy management and observations from the field are exchanged accurately. This is the first of a sequence of two courses developed to meet these goals.

ANSC 4580 Advanced Spanish for Dairy Producers

Fall. 3 credits. Prerequisite: ANSC 4570 or permission of instructor. S–U or letter grades. Staff.

Students with a focus on dairy management need to be able to communicate with the Spanish-speaking workforce, and upward mobility of that workforce depends on knowledge of cutting-edge dairy management. This is the second course of a two-sequence program that will further develop the students' skills to be able to communicate in Spanish higher-level dairy production tasks and principles to Spanish-speaking dairy workers.

ANSC 4700 Merchandising Beef Cattle

Fall. 2 credits. S–U or letter grades. M. J. Baker.

Introduction to the merchandising of replacement beef heifers. Topics of study will include budgeting, advertising, animal preparation, cataloging, clerking, and reporting. Students will gain practical knowledge through lecture as well as hands-on experience by planning, organizing, and conducting a sale of bred beef heifers from the Empire Heifer Development Program.

ANSC 4940 Special Topics in Animal Science

Fall or spring. 4 credits max. Prerequisite: undergraduate standing. S–U or letter grades. Staff.

The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the semester begins. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

ANSC 4960 Internship in Animal Science

Fall or spring. 1–3 credits, variable; 6 credits max. during undergraduate career. Students must register using independent study form (available in 140 Roberts Hall). S–U grades only. Staff.

Structured, on-the-job learning experience under supervision of qualified professionals in a cooperating organization (e.g., farm, agribusiness, pharmaceutical company, zoo, educational institution). Internships are

arranged by the student and must be approved in advance by the student's academic advisor. The internship should provide a professionally supervised experience with at least 60 hours on the job per credit required. All 4960 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

ANSC 4970 Individual Study in Animal Science

Fall or spring. 1–3 credits, variable; may be repeated for credit. Intended for students in animal sciences. Prerequisite: permission of instructor. Students must register using independent study form (available in 140 Roberts Hall). S–U or letter grades. Staff.

May include individual tutorial study or a lecture topic selected by a professor. Because topics may change, the course may be repeated for credit.

ANSC 4980 Undergraduate Teaching

Fall or spring. 1–3 credits, variable; limited to two experiences during undergraduate career. Prerequisite: GPA of at least 2.7.

Students must register using independent study form (available in 140 Roberts Hall). Designed to consolidate the student's knowledge. A participating student assists in teaching a course allied with his or her education and experience. The student is expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

ANSC 4990 Undergraduate Research

Fall or spring. 6 credits max. during undergraduate career. Prerequisite: junior or senior standing; GPA of at least 2.7. Not open to students who have earned 6 or more undergraduate research credits elsewhere in the college. Students must register using independent study form (available in 140 Roberts Hall).

Affords opportunities for students to carry out independent research under appropriate supervision. Each student is expected to review pertinent literature, prepare a project outline, conduct the research, and prepare a report.

ANSC 4991 Undergraduate Honors Research in Animal Science

Fall and spring. 1–6 credits; max. 6. Prerequisite: permission of instructor. Students must register using independent study form (available in 140 Roberts Hall).

Intended for qualified students pursuing the research honors program in animal science.

[ANSC 6030 Mineral Nutrition: Metabolic, Health, and Environmental Aspects (also NS 6030)]

Fall. 2 credits. Prerequisites: biochemistry, physiology, and nutrition courses. Letter grades only. Offered alternate years; next offered 2010–2011. X. G. Lei and C. C. McCormick.

Emphasizes metabolism, gene regulation, antioxidation, and genetic defects related to mineral nutrition. Discusses effective approaches to improve global mineral nutrition by agriculture and food systems.]

[ANSC 6060 Ruminant Nutrition: Microbial Ecology and Forage Chemistry]

Spring. 4 credits. Prerequisites: ANSC 2120, biochemistry course; senior or graduate standing or permission of instructor. S–U or letter grades. Offered alternate years; next offered 2010–2011. Staff.

Provides an overview of ruminant nutrition with an emphasis on microbial ecology, forage chemistry, and rumen function.]

ANSC 6100 Animal Science Seminar

Fall and spring. 1 credit. Prerequisite: graduate standing. S–U grades only. R. E. Austic.

Weekly seminar on topics related to animal science. The requirement for an S grade is regular attendance at seminars during the semester.

ANSC 6190 Field of Nutrition Seminar (also NS 6190)

Fall and spring. 0 credits. No grades given. For description, see NS 6190.

ANSC 6210 Reproductive Physiology/Endocrinology Seminar

Fall and spring. 1 credit. Prerequisite: graduate standing or permission of instructor. S–U grades only. W. R. Butler and staff.

Current research in reproductive physiology is presented by faculty and staff members, graduate students, and invited speakers.

ANSC 6220 Seminar in Animal Metabolism

Fall and spring. 1 credit. Prerequisite: permission of instructor. S–U grades only. Y. R. Boisclair and D. E. Bauman.

Current issues in metabolism are discussed as they relate to productivity, well-being, and diseases of animals. Students present research proposals for new initiatives, progress reports on ongoing projects and recent peer-reviewed publications of high significance.

ANSC 6940 Special Topics in Animal Science

Fall or spring. 4 credits max. Prerequisite: graduate standing. S–U or letter grades.

The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the semester begins. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

ANSC 7900 Graduate-Level Thesis Research

Fall or spring. Credit TBA, max. 12 per semester. Prerequisite: permission of advisor. S–U grades only. Graduate faculty.

For students in a Ph.D. program *only before* "A" exam has been passed.

ANSC 8900 Master's-Level Thesis Research

Fall or spring. Credit TBA, max. 12 per semester. Prerequisite: permission of advisor. S–U grades only. Graduate faculty.

For students admitted specifically to a master's program.

ANSC 9900 Doctoral-Level Thesis Research

Fall or spring. Credit TBA, max. 12 credits per semester. Prerequisite: permission of advisor. S-U grades only. Graduate faculty. For students admitted to candidacy after "A" exam has been passed.

Related Courses in Other Departments

Introductory Animal Physiology (BIOAP 3110)

Animal Physiology Experimentation (BIOAP 3190)

Milk Quality (FDSC 3510)

Agriculture in the Developing Nations (IARD 6020)

Lipids (NS 6020)

Basic Immunology Lectures (BIOG 3050)

Micronutrients: Function, Homeostasis, and Assessment (NS 6310)

Regulation of Macronutrient Metabolism (NS 6320)

BIOLOGICAL AND ENVIRONMENTAL ENGINEERING

D. J. Aneshansley, chair (104 Riley-Robb Hall; 255-2270, -2465); B. A. Ahner, associate chair; L. D. Albright, L. T. Angenent, A. J. Baeumner, J. A. Bartsch, A. K. Datta, K. G. Gebremedhin, D. A. Haith, P. G. Hess, J. B. Hunter, L. H. Irwin, D. Luo, J. C. March, J.-Y. Parlange, G. E. Rehkugler, N. R. Scott, R. M. Spanswick, T. S. Steenhuis, M. B. Timmons, L. P. Walker, M. F. Walter, M. T. Walter. Lecturers: C. L. Anderson, L. D. Geohring

BEE 1200 The BEE Experience

Spring. 1 credit. Requirement for CALS BEE freshmen. Not required for students who have completed ENGRG 1050. Prerequisite: BEE majors or permission of instructor. Letter grades only. M. F. Walter.

Forum covering the career opportunities for engineering students and the activities and curricula that lead to these opportunities. A series of seminars are given by practicing engineers, Cornell faculty members, alumni, staff from Cornell career services offices, and students. Students develop their undergraduate course plans, complete a web search assignment to locate jobs and internships, and select future courses to meet their academic objectives and career goals.

BEE 1510 Introduction to Computer Programming

Fall. 4 credits. Limited to 18 students per lab and rec. No previous programming experience assumed. Pre- or corequisite: MATH 1910 or equivalent. Letter grades only. C. L. Anderson.

Introduction to computer programming and concepts of problem analysis, algorithm development, and data structure in an engineering context. The structured programming language MATLAB is used, implemented on interactive personal computers and applied to problems of interest in biological and environmental engineering.

BEE 2220 Bioengineering Thermodynamics and Kinetics

Spring. 3 credits. Prerequisites: MATH 1920, BIOG 1110, PHYS 2213, and chemistry course completed or concurrent. Letter grades only. J. B. Hunter.

Living systems rely on chemical and phase equilibria, precise coordination of biochemical pathways, and the release of chemical energy as heat, all of which are governed by the laws of thermodynamics and the rates of chemical reactions. The course covers concepts and laws of thermodynamics as applied to phase transformations, work, heat, and chemical reactions; and reaction kinetics applied to industrial processes and living systems, all with a focus on biological examples.

BEE 2510 Engineering for a Sustainable Society (also ENGRD 2510)

Fall. 3 credits. Pre- or corequisite: MATH 2930. Letter grades only. B. A. Ahner. Case studies of contemporary environmental issues including pollutant distribution in natural systems, air quality, hazardous waste management, and sustainable development. Emphasis is on the application of math, physics, and engineering sciences to solve energy and mass balances in environmental sciences. Introduces students to the basic chemistry, ecology, biology, ethics, and environmental legislation relevant to the particular environmental problem. BEE students must complete either BEE 2510 or BEE 2600 according to their academic plan. BEE students who complete both BEE 2510 and BEE 2600 receive engineering credit for only one of these courses.

BEE 2600 Principles of Biological Engineering (also ENGRD 2600)

Fall. 3 credits. Pre- or corequisite: MATH 2930, BIOG 1101-1104 or 1105/1106. Letter grades only. A. J. Baeumner.

Focuses on the integration of biological principles with engineering, math, and physical principles. Students learn how to formulate equations for biological systems in class and practice in homework sets. Topics range from molecular principles of reaction kinetics and molecular binding events to macroscopic applications such as energy and mass balances of bioprocessing and engineering design of implantable sensors. BEE students must complete either BEE 2510 or BEE 2600 according to their academic plan. BEE students who complete both BEE 2510 and BEE 2600 receive engineering credit for only one of these courses.

BEE 3050 Principles of Navigation (also NAVS 3050)

Spring. 4 credits. Three classes each week (lec-rec-project work). Letter grades only. Lt. Raineault.

Introduction to the fundamentals of marine navigation emphasizing piloting and celestial navigation procedures. Covers coordinate systems, chart projections, navigational aids, instruments, compass observations, time, star identification, use of the nautical almanac, tides, and currents. Also *briefly* discusses electronic navigation systems.

BEE 3299 Sustainable Development: A Web-Based Course

Spring, summer. 3 credits. Prerequisite: at least sophomore standing. S-U or letter grades. M. F. Walter and N. R. Scott. Sustainable development is the dominant economic, environmental, and social issue of

the 21st century. This course develops the concepts of sustainable development as an evolutionary process, demanding the integration of the physical sciences and engineering with the biological and social sciences for design of systems. Topics include the nature of ecosystems, global processes, sustainable communities, and industrial ecology, renewable energy, and life cycle analysis.

BEE 3310 Bio-Fluid Mechanics

Fall. 4 credits. Prerequisites: ENGRD 2020 and engineering math sequence. Letter grades only. K. G. Gebremedhin. Properties of Newtonian and non-Newtonian fluids; hydrostatic and dynamic forces; principles of continuity, conservations of mass, energy and momentum and their applications; laminar and turbulent flows and boundary layer, introduction to Navier Stokes; dimensional analysis and similarity; blood flow in the cardiovascular system; gas exchange in the pulmonary system; blood flow and sodium transport in the kidney. The major concepts are covered by case studies.

BEE 3500 Biological and Environmental Transport Processes

Fall. 3 credits. Pre- or corequisites: MATH 2930 and fluid mechanics course. Letter grades only. A. K. Datta.

Focuses on understanding the principles of heat and mass transfer in the context of biological (biomedical/bioprocessing/bioenvironmental) systems. Emphasizes physical understanding of transport processes and simple reaction rates with application examples from plant, animal, and human biology in the bioenvironment (soil/water/air), and industrial processing of food and biomaterials.

BEE 3600 Molecular and Cellular Bioengineering (also BME 3600)

Spring. 3 credits. Prerequisite: BEE 2600, biochemistry, linear algebra, ordinary differential equations, or permission of instructor. Letter grades only. J. C. March. Biotechnology viewed at the cellular and molecular level. Advances in biotechnology will be broken down to their functional parts using the tools of biological engineering (thermodynamics, transport, kinetics, etc.) to understand how and why they work with an emphasis on design. Particular attention paid to gene therapy, synthetic biology, protein engineering, and nucleic acid engineering. Case studies in biomedical, bioprocess, and bioenvironmental engineering.

BEE 3650 Properties of Biological Materials

Spring. 3 credits. Satisfies BE laboratory experience requirement. Pre- or corequisite: ENGRD 2020. Letter grades only. J. A. Bartsch.

Mechanics and structural properties of biological materials; mechanical testing of animal, plant, and food products. Laboratory exercises involve quasistatic and dynamic testing of materials and interpretation of test results. Uses experimental techniques to determine engineering properties of these materials.

BEE 3680 Biotechnology Applications: Animal Bioreactors

Fall. 3 credits. Prerequisite: biochemistry course or permission of instructor. Letter grades only. Offered alternate years. J. B. Hunter.

Introduces students to the biotechnological applications of animals; their organs, tissues, and cells as bioreactors for the production of substances such as pharmaceuticals; growth factors, anti-tumor proteins, antibodies, and vaccines. Exposes students to various design issues, technical constraints, societal concerns, and ethical considerations of this biotechnology.

[BEE 3710 Physical Hydrology for Ecosystems]

Spring. 3 credits. Prerequisite: MATH 1920 or permission of instructor. Letter grades only. Offered alternate years; next offered 2010–2011. M. T. Walter.

This is an introduction to physical hydrology with an emphasis on roles and interactions between hydrological processes and ecological, biogeochemical, and human systems. <http://hive.bee.cornell.edu/faculty/walter/BEE371Index.htm>

BEE 4010 Renewable Energy Systems

Spring. 4 credits. Prerequisite: college physics. Letter grades only. L. D. Albright. Introduces energy systems with emphasis on quantifying costs and designing/optimizing renewable energy systems to convert environmental inputs into useful forms of energy. Covers solar energy, small-scale hydropower, wind, bio-conversion processes, house energy balances. Focuses on the technologies and small-scale system design, not policy issues. Use of spreadsheets is extensive.

BEE 4270 Water Measurement and Analysis Methods

Fall. 3 credits. Satisfies BE and EnvE laboratory experience requirement. Prerequisites: fluids or hydrology course and MATH 1910. Letter grades only. L. D. Geohring and T. S. Steenhuis. Get wet and muddy learning how to monitor and characterize water and soil management problems in the natural environment. This is a field-based lab course that integrates science and engineering technologies, using various measurement equipment and analytical techniques to quantify water flow and quality parameters in surface and subsurface environments. Measurement accuracy, water sampling quality assurance protocols, and interpretation of watershed contaminants are addressed.

BEE 4350 Principles of Aquaculture

Spring. 3 credits. Prerequisite: at least junior standing. Letter grades only. No-one is allowed to add course after 2nd lec. Two required field trips require class to return to campus at 7 p.m. M. B. Timmons.

An in-depth treatment of the principles of aquaculture: fish biology, waste treatment, engineering design, fish health, nutrition, processing, etc. This course is intended to build upon the undergraduate's previous course background and interests. Includes supervised "hands-on" laboratory experiences.

BEE 4500 Bioinstrumentation

Spring. 4 credits. Satisfies both BE laboratory experience and BE capstone design requirement. Prerequisites: MATH 2940, introductory computing, two semesters of physics, statistics, or permission of instructor. Letter grades only. D. J. Aneshansley.

Bioinstrumentation applications are emphasized in this laboratory-based course.

Electronic instruments from sensor to computer are considered. Static and dynamic characteristics of components and systems are examined theoretically and empirically. General analog and digital signal condition circuits are designed, constructed, and tested. A variety of biological applications of instrumentation are discussed.

BEE 4530 Computer-Aided Engineering: Applications to Biomedical Processes (also MAE 4530)

Spring. 3 credits. Satisfies BE capstone design requirement. Satisfies College of Engineering technical writing requirement. Prerequisite: heat and mass transfer (BEE 3500 or equivalent). Letter grades only. A. K. Datta.

Introduction to simulation-based design as an alternative to prototype-based design; analysis and optimization of complex real-life processes for design and research, using industry-standard physics-based computational software. Emphasis is on problem formulation, starting from a real process and developing its computer model. Covers biomedical processes in thermal therapy and drug delivery that involve heat transfer, mass transfer, and fluid flow. Computational topics introduce the finite-element method, pre- and post-processing, and pitfalls of using computational software. Students choose their own semester-long biomedical project, which is the major part of the course (no final exam).

[BEE 4540 Physiological Engineering]

Fall. 3 credits. Satisfies BE laboratory experience requirement. Prerequisites: differential equations, 2 semesters of physics, introductory biology, statistics. Letter grades only. Next offered 2010–2011. D. J. Aneshansley.

Measurements of biological systems are integrated with mathematical models of animal physiology. Laboratory experiments and problem sets examine membrane transport, senses, and interacting physiological systems.]

BEE 4590 Biosensors and Bioanalytical Techniques

Fall. 3 credits. Prerequisites: biochemistry course and permission of instructor. Letter grades only. A. J. Baemumner.

Provides students with an understanding of the scientific and engineering principles of biosensors and bioanalytical techniques. Addresses selected topics from simple biosensors to micro/nanofabricated Micro Total Analysis Systems (MicroTAS). Biosensor and MicroTAS applications in environmental analysis, food safety, and medical diagnostics are explored. Students give oral presentations in lecture, analyze biosensors published in literature, and theoretically design a biosensor based on criteria discussed in class. Undergraduate students work together in teams of two to three. Meets concurrently with BEE 6590. BEE 6590 students work independently on individual biosensor projects.

BEE 4600 Deterministic and Stochastic Modeling in Biological Engineering

Fall. 3 credits. Prerequisites: MATH 2930, MATH 2940, BEE 3500 or equivalent, Mass and Energy Balances, or permission of instructor. Letter grades only. J. C. March.

This course covers modeling biological systems from an engineering standpoint. Starting with deterministic approaches, the

class will functionally decompose and mathematically model systems important to biological engineers (including bioprocessing, biomedicine, and microbial ecology). Mechanistic aspects of biology will be handled using stochastic (probabilistic) approaches in the second half of the semester.

BEE 4640 Bioseparation Processes

Fall. 3 credits. Prerequisites: introductory biochemistry, physics, MATH 1920, BEE 2600 or equivalent, or permission of instructor. Offered alternate years. S–U or letter grades. J. B. Hunter.

Bioseparation is the science and engineering of fractionating and purifying biological materials: DNA, proteins, living cells, antibiotics, biofuels, and even foods. This course covers separation methods used in the biotechnology industry, principles governing these methods, approaches to improving bioseparation performance, and the special challenges of scale-up. Key topics (centrifugation, filtration, extraction, membrane methods, ion exchange, chromatography, electrophoresis) are supplemented with student presentations. Intended for seniors and graduate students in engineering, chemistry, biology, and food science.

[BEE 4710 Introduction to Groundwater (also EAS 4710)]

Spring. 3 credits. Prerequisites: MATH 2930, fluid mechanics or hydrology course. S–U or letter grades. Field trip. Offered alternate years; next offered 2010–2011. L. M. Cathles, M. T. Walter, and T. S. Steenhuis.

Intermediate-level study of aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, groundwater hydraulics, soil water, and solute transport.]

BEE 4730 Watershed Engineering

Fall. 4 credits. Satisfies BE and EnvE capstone design requirement. Satisfies College of Engineering technical writing requirement. Satisfies BE laboratory experience requirement. Prerequisite: CEE 3310 or hydrology course. Letter grades only. M. T. Walter.

This course teaches basic design and analysis as practiced for water control and nonpoint source pollution prevention. We will discuss the origins of design approaches including their theoretical bases but this is not a theory course. Most of the course is dedicated to practicing applied design. Assignments are generally representative of real-life engineering problems and will involve as much hands-on experience as possible. Some example topics include risk analysis, water conveyance, nonpoint source pollution control, stream restoration, stormwater management, and erosion control.

BEE 4740 Water and Landscape Engineering Applications

Spring. 3 credits. Satisfies BE capstone design requirement. Prerequisites: fluids or hydrology course or permission of instructor. Letter grades only.

L. D. Geohring and T. S. Steenhuis. This course will focus on how water moves in soil and the implications for design of drainage and irrigation systems in the landscape. The course addresses aspects of soil physics, flow in porous media, water quality and water supply or disposal in regard to drainage and irrigation applications. Emphasis is on problem solving of actual

situations, and a major site-design project is required.

BEE 4750 Environmental Systems Analysis

Fall. 3 credits. Prerequisites: computer programming and one year of calculus. Letter grades only. D. A. Haith.

Applications of mathematical modeling, simulation, and optimization to environmental-quality management. Fate and transport models for contaminants in air, water, and soil. Optimization methods (search techniques, linear programming) to evaluate alternatives for solid-waste management and water and air pollution control. Introduction to hydrologic simulation (runoff and streamflow). Software packages for watershed analyses of point and nonpoint source water pollution.

BEE 4760 Solid Waste Engineering

Spring. 3 credits. Prerequisites: one semester of physics and chemistry. Letter grades only. D. A. Haith.

Planning and design of processes and facilities for management of municipal solid wastes. Source characterization and reduction; collection and transport systems; waste-to-energy combustion; sanitary landfills; composting; recycling and materials recovery facilities; and hazardous waste management. Emphasizes quantitative analyses.

BEE 4800 Our Changing Atmosphere: Global Change and Atmospheric Chemistry (also EAS 4800)

Fall. 3 credits. Prerequisites: CHEM 2090, MATH 1920, PHYS 1112 or equivalent, or permission of instructor. S-U or letter grades. P. G. Hess.

This course investigates the science behind changes in our atmosphere's composition and its relation to global change. We will examine the chemistry and physics that determines atmospheric composition on global scales including the effects of biogeochemistry and atmospheric photochemistry.

BEE 4810 LRFD-Based Engineering of Wood Structures (also CEE 4810)

Spring. 3 credits. Satisfies BE capstone design requirement when co-registered in BEE 4960. Prerequisite: ENGRD 2020. Letter grades only K. G. Gebremedhin.

Computer-aided and manual computation procedures of Load and Resistance Factor Design (LRFD)-based engineering of wood structures. National design codes and standards; estimation of factored design loads and load combinations; mechanical properties of wood and wood products; designs of beams, columns, trusses, frames, arches, bridges, diaphragms; connections and wood structural systems. Also discusses engineering design judgment as an integral component of the quantitative design procedure.

BEE 4840 Metabolic Engineering

Spring. 3 credits. Prerequisite: biochemistry course or permission of instructor. Letter grades only. R. M. Spanswick.

The principles of metabolic engineering as they relate to the regulation of metabolic pathways, including membrane transport, are considered in terms of enzyme kinetics and metabolic control analysis. Case studies, reflecting the interests of the instructor, include examples involving higher plants. Each student is expected to investigate one topic in depth and make a short class presentation.

BEE 4860 Industrial Ecology of Agriculturally Based Bioindustries

Spring. 3 credits. Prerequisites: one year of calculus, some knowledge of MATLAB. Letter grades only. L. P. Walker.

Agricultural-based biofuels and bioproducts systems are very complex and highly integrated. Each of these subsystems are composed of a number of biological, chemical, and physical processes that can be interconnected to a multitude of ways to generate the essential material and energy flows for the production of biofuels and bioproducts. For this course an input/output modeling methodology is employed to develop and manipulate the structure of complex agriculturally based bio-industries and to generate the material, energy, and monetary flows. Students will use linear algebra and state space tools in the MATLAB toolbox to simulate static and dynamic behavior of these complex webs of connected processes and to conduct life-cycle analysis of these complex webs.

BEE 4870 Sustainable Energy Systems

Fall. 3 credits. Satisfies BE capstone design requirement. Intended for upper-level undergraduates and graduate students.

Prerequisites: BEE 3500 and thermodynamics course. Letter grades only. L. T. Angenent and N. R. Scott.

Offers a systems approach to understanding renewable energy systems (solar, wind, and biomass) and their conversion processes, from various aspects of biology, physics, engineering, environmental impacts, economics, and sustainable development.

BEE 4890 Entrepreneurial Management for Engineers

Fall. 4 credits. Satisfies College of Engineering technical writing requirement. Prerequisites: junior standing; ENGRD 2700 or CEE 3040 or equivalent highly recommended. Letter grades only. No one allowed to add course after second week. M. B. Timmons.

The course focuses on how to start a new company centered on engineering or biological technologies. Course objectives include coverage of entrepreneurship principles, fundraising, negotiation, financial calculations (internal rate of return, time value of money, pro forma statements); legal structures of businesses; project management; and to develop an awareness of issues related to professional ethics; and technical writing and communication. Majority of work done in teams including a complete business plan that is presented to angel investors. Business plans must require less than \$100K in startup funding and may result in actual investment by the angel investor group.

BEE 4900 Biofuels: The Economic and Environmental Interactions (also AEM 6900)

Spring. 2 credits. Prerequisites: senior or graduate standing, others by permission of instructor; course in microeconomics. S-U or letter grades. P. G. Hess.

This course surveys the latest research on the science and economics of biofuels. Questions addressed include the environmental and economic impacts of biofuel use and whether the use of biofuels justifies public policy intervention. The class will consist of a colloquium, discussion with the colloquium speaker, and an in-class discussion section.

BEE 4930 Technical Writing for Engineers

Fall, spring. 1 credit. Meets College of Engineering technical writing requirement. Letter grades only. Staff.

Covers communication skills necessary for oral and written technical project reports. Also considers outlines, style, audience, and general presentation mechanics.

BEE 4940 Special Topics in Biological and Environmental Engineering

Fall or spring. 4 credits max. S-U or letter grades. Staff.

The department teaches "trial" courses under this number. Offerings vary by semester and will be advertised by the department. Courses offered under this number will be approved by the department curriculum committee and the same course will not be offered twice under this number. Each 4940 has a unique course ID for enrollment.

BEE 4960 Capstone Design in Biological and Environmental Engineering

Spring. 1 credit. Corequisite: BEE 4810. Letter grades only. Staff.

Involves capstone design experience, including a team project incorporating analysis, design, evaluation, synthesis, and a written and oral report of the end product.

BEE 4970 Individual Study in Biological and Environmental Engineering

Fall and spring. 1-4 credits. Prerequisite: written permission of instructor and adequate ability and training for work proposed; normally reserved for seniors in upper two-fifths of their class. Students from all colleges must register using independent study form (available in 207 Riley-Robb Hall). Letter grades only. See department office for course ID specific to your project advisor. Staff.

Special work in any area of biological and environmental engineering on problems under investigation by the department or of special interest to the student, provided, in the latter case, that adequate facilities can be obtained.

BEE 4980 Undergraduate Teaching

Fall and spring. 1-4 credits. Prerequisite: written permission of instructor. Letter grades only. Students from all colleges must register using independent study form (available in 207 Riley-Robb Hall). See department office for course ID specific to your project advisor. Staff.

The student assists in teaching a biological and environmental engineering course appropriate to his or her previous training. The student meets with a discussion or laboratory section, prepares course materials, grades assignments, and regularly discusses objectives and techniques with the faculty member in charge of the course.

BEE 4990 Undergraduate Research

Fall and spring. 1-4 credits. Prerequisites: normally reserved for seniors in upper two-fifths of their class; adequate training for work proposed; written permission of instructor. Letter grades only. Students from all colleges must register using independent study form (available in 207 Riley-Robb Hall). See department office for course ID specific to your project advisor. Staff.

Research in any area of biological or environmental engineering on problems under investigation by the department or of special interest to the student, provided that

adequate facilities can be obtained. The student must review pertinent literature, prepare a project outline, carry out an approved plan, and submit a formal final report.

BEE 4991-4992 BEE Honors Research

Fall and spring. 1-6 credits, variable. Prerequisite: enrollment in BEE research honors program. Students must be eligible for Latin honors and complete honors program application by third week of fall semester, senior year. Letter grades only. Staff.

Intended for students pursuing the research honors program in BEE.

BEE 5010 Bioengineering Seminar (also BME 5010)

Fall, spring. 1 credit. Prerequisite: junior, senior, or graduate standing. S-U grades only. Staff.

To give you, the engineer-in-training, a *broad* overview of different aspects of biological and biomedical engineering including business, legal, and clinical issues. To give the students a working knowledge of how abstracts are written and revised.

BEE 5330 Engineering Professionalism

Spring. 1 or 2 credits*. Prerequisite: graduate student with accredited engineering degree or senior who will graduate with accredited engineering degree. Must register to take Fundamentals of Engineering Exam.** S-U or letter grades. Lec only 1st 10 weeks of semester. M. B. Timmons, J. R. Stedinger, other Engineering Faculty.

Presentations address engineering professionalism and ethics and provide preparation for the general NY FE Examination taught in a team-based format. The second-credit ethics portion emphasizes the engineer's professional responsibilities for the health and welfare of the public and the guiding principles for a professional engineer. Case histories on engineering ethics will be examined and students will write their own personal statement addressing integrity. Homework addresses FE exam preparation, and students complete the formal comprehensive review of engineering subjects associated with the Fundamentals of Engineering Exam.

*1-credit option includes FE review only.

**Students must file their N.Y. FE Exam application by either November 1 of the previous year or by May 1 of the spring semester to be enrolled in BEE 5330. The FE exam registration and sitting fees total \$205 and are paid to the N.Y. State Education Department and the testing service, not to Cornell. The N.Y. FE Exam is offered in April and October; the April exam may be taken at Cornell and other N.Y. locations; the October exam is not offered at Cornell.

BEE 5901-5902 M.P.S. Project

Fall and spring. 1-6 credits. Requirement for each M.P.S. candidate in field. Letter grades only. BEE graduate faculty.

Comprehensive project emphasizing the application of agricultural technology to the solution of a real problem.

BEE 5951-5952 Master of Engineering Design Project

Fall and spring. 3-6 credits. Prerequisite: admission to M.Eng. degree program. Letter grades only. BEE graduate faculty.

Comprehensive engineering design projects relating to the candidate's area of specialization. Projects are supervised by faculty members on an individual basis. A formal project report and oral presentation of the design project are required for completion of the course(s). A minimum of 3 to a maximum of 12 credits of 5951-5952 is required for the M.Eng. degree.

BEE 6430 Veterinary Perspectives on Pathogen Control in Animal Manure (also VTMED/BIOIMI 6430)

Spring, eight weeks. 2 credits. Prerequisite: third- and fourth-year veterinary students; graduate students, advanced undergraduate students interested in agricultural engineering as related to animal manure management. D. D. Bowman.

In-depth look at the management of pathogens in animal manures. Reviews the pathogens involved, the role of governing agencies, the survival of pathogens in the field, and methods of pathogen destruction. Discusses commercial methods of manure processing for the control of these pathogens for the protection of other animals and the human population. Concludes with class discussions with major stakeholders representing the dairy, beef, pork, and poultry industries and their understanding of the problem as it relates to veterinary students.

BEE 6470 Water Transport in Plants (also BIOPL 6510)

Fall. 2 credits. Letter grades only. Offered alternate years. R. M. Spanswick.

Topics include water relations of plant cells and tissues using water potential terminology; permeability of plant cells to water and the role of aquaporins; transport of water through whole plants, including transpiration, stomatal physiology, and the modifications due to plant communities; water status and plant growth in relation to water stress.

[BEE 6490 Solute Transport in Plants (also BIOPL 6490)]

Fall. 3 credits. Letter grades only. Offered alternate years; next offered 2010-2011. R. M. Spanswick.

A fundamental treatment of the transport of ions and small organic molecules in plants.]

[BEE 6510 Bioremediation: Engineering Organisms to Clean Up the Environment]

Spring. 3 credits. Prerequisites: BIOIMI 2900 or BIOBM 3310 or permission of instructor. Letter grades only. Next offered 2010-2011. B. A. Ahner.

Through lectures and current literature, students evaluate the benefits as well as the current obstacles to effective bioremediation; includes examples of genetically engineered organisms.]

BEE 6550 Thermodynamics and Its Applications

Fall. 3 credits. Prerequisite: MATH 2930 or equivalent; for undergraduates, permission of instructor. Letter grades only. Offered alternate years. J.-Y. Parlange.

Thermodynamics and its applications to problems in engineering and agriculture. Topics include basic concepts (equilibrium, entropy, processes, systems, potentials, stability, phase transitions) and applications (soil and water processes, dilute solutions, electromagnetism, surface phenomena, heat and mass transport, and structure of organizations).

BEE 6590 Biosensors and Bioanalytical Techniques

Fall. 3 credits. Prerequisites: biochemistry course and permission of instructor. Letter grades only. A. J. Baeumner. For description, see BEE 4590.

[BEE 6710 Analysis of the Flow of Water and Chemicals in Soils]

Fall. 3 credits. Prerequisites: four calculus courses and fluid mechanics course; for undergraduates, permission of instructor. Letter grades only. Offered alternate years; next offered 2010-2011. J.-Y. Parlange. Describes the chemical and water flows on a soil surface, in the vadose zone, and through the aquifer. Discusses current analytical, semi-analytical, and computer-based techniques.]

BEE 6720 Drainage

Spring. 4 credits. Prerequisites: BEE 4710 or BEE 4730. Letter grades only. Offered alternate years. T. S. Steenhuis and L. D. Geohring.

Discusses the theory of water and solute flow in aquifers, hill slopes, and the vadose zone as it relates to artificial drainage. Critically reviews drainage design as it relates to agricultural land, landfills, and land application sites. Examines the importance of preferential flow and matrix flow on water quality of drainage waters. Laboratories provide hands-on experience with measuring soil parameters and for actual drainage design.

BEE 6740 Ecohydrology

Spring. 3 credits. Prerequisite: ecology or hydrology course. Offered alternate years. Letter grades only. M. T. Walter.

The objective of this course is to investigate novel topics that involve the interactions between physical hydrological processes and ecosystem processes, including the impacts of human activities on the ecohydrological system. The course is designed to encourage teams of students from historically disparate disciplines to collaboratively combine their unique skills and insights to answer multidisciplinary ecohydrological questions. This course will consider a broad range scales from a stomate and a soil pore to a forest, watershed, and region, with emphasis placed on those scales and systems most appropriate to student interests. Through course work we will clarify the current understanding of various topics, identify knowledge gaps, develop hypotheses, and test them quantitatively by creating models and analyzing available data. The goal of this course is to identify the basic principles of ecohydrology and become familiar and comfortable with a range of quantitative tools and approaches for answering ecohydrological questions.

BEE 6870 The Science and Engineering Challenges to the Development of Sustainable Bio-Based Industries

Fall. 1 credit. Prerequisite: graduate standing. S-U grades only. L. P. Walker.

Environmentally sustainable alternatives for our energy and chemical needs are critical. This seminar series explores challenges facing the development of industries that use biologically derived materials to produce useful chemicals and energy for society. Topics include natural products from biological systems, conversion of biomass to fuel and other commodities, and the use of

biological systems for environmental bioremediation.

BEE 6940 Graduate Special Topics in Biological and Environmental Engineering

Fall or spring. 4 credits max. S-U or letter grades. BEE graduate faculty. The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department. Courses offered under this number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number. Each 6940 has a unique course ID number.

BEE 6970 Graduate Individual Study in Biological and Environmental Engineering

Fall or spring. 1-6 credits. Prerequisite: permission of instructor. S-U or letter grades. BEE graduate faculty. Topics are arranged by the staff at the beginning of the semester.

BEE 7000 Orientation to Graduate Study

Fall, first seven weeks. 1 credit. Prerequisite: new graduate students in BEE. S-U grades only. A. J. Baemmer. Introduction to BEE research policy, programs, methodology, resources, and degree candidates' responsibilities and opportunities.

BEE 7010 BEE Seminar Series

Spring. 1 credit. S-U or letter grades. J. C. March and M. T. Walter. Presentation and discussion of research and special developments pertinent to biological and environmental engineering and related fields.

BEE 7540 Water and Culture in the Mediterranean: A Crisis

Spring. 3 credits. Prerequisite: graduate standing or permission of instructors. S-U or letter grades. T. S. Steenhuis, G. Holst-Warhaft, et al. The course addresses the crisis of water in the Mediterranean region, through case studies situated in watershed basins, especially the Nile. It focuses on attitudes, conflicts, and relationships of local people and nations toward water, expressed in culture, environmental laws, and watershed management practices.

BEE 7600 Nucleic Acid Engineering (also BME 7600)

Spring. 2 credits. Prerequisite: graduate standing; seniors by permission of instructor. S-U or letter grades. D. Luo. Nucleic acid engineering focuses on manipulating nucleic acid molecules in a true engineering sense as well as in the "genetic engineering" sense by treating nucleic acids (including DNA, RNA, PNA, and TNA) as both genetic and generic materials. Both biomedical and nonbiomedical applications of nucleic acid engineering, including tool kits for nucleic acid engineering and current examples of DNA-based engineering, DNA nanotechnology, and DNA-based medicine are introduced. Efficient and effective literature reading and evaluation are emphasized.

BEE 7710 Soil and Water Engineering Seminar

Fall and spring. 1 credit. Prerequisite: graduate standing or permission of instructor. S-U or letter grades. T. S. Steenhuis, J.-Y. Parlange, M. F. Walter, and M. T. Walter. Study and discussion of research or design procedures related to selected topics in watershed management, erosion control, hydrology, colloid transport, and water quality.

BEE 8900 Master's-Level Thesis Research

Fall and spring. 1-15 credits. Prerequisite: permission of advisor. S-U grades only. BEE graduate faculty. Variable credit for M.S. research.

BEE 9900 Doctoral-Level Thesis Research

Fall and spring. 1-15 credits. Prerequisite: permission of advisor. S-U grades only. BEE graduate faculty. Variable credit for Ph.D. research.

BIOLOGICAL SCIENCES

The program of study in biology is coordinated by the Office of Undergraduate Biology. For course descriptions, see the separate section "Biological Sciences."

BIOLOGY & SOCIETY

The undergraduate major field of study in biology & society is offered through the Department of Science and Technology Studies. For a full description of courses that fulfill field requirements, see "Biology & Society" under the College of Arts and Sciences.

BIOMETRY AND STATISTICS

J. Booth, chair (1178 Comstock Hall, 254-6505, 255-5488), C. Bustamante, G. Hooker, J. Mezey, S. J. Schwager, A. C. Siepel, R. Strawderman, M. Wells

The Department of Biological Statistics and Computational Biology offers the following courses in Biometry and Statistics. Students must register under Course Listings: College of Agriculture and Life Sciences—Biometry and Statistics.

BTRY 1150 Introduction to Quantitative Methods

Spring. 4 credits. Review of basic algebra concepts, the equation of a line, and systems of linear equations; properties of functions and applications, including polynomial, exponential, and logarithmic functions; basic probability laws, counting principles, discrete probability distributions, expected value; frequency distributions, measures of central tendency and variation; the binomial and normal distributions.

BTRY 3010 Biological Statistics I (also NTRES 3130, STSCI 2200)

Fall. 4 credits. Develops and applies statistical methods to problems encountered in the biological and environmental sciences. Methods include data visualization, population parameter estimation, sampling, bootstrap resampling, hypothesis testing, the Normal and other probability distributions, and an introduction to modeling. Carries out applied analysis in a statistical computing environment.

BTRY 3020 Biological Statistics II (also NTRES 4130, STSCI 3200)

Spring. 4 credits. Prerequisite: BTRY 3010 or 6010. Applies linear statistical methods to quantitative problems addressed in biological and environmental research. Methods include linear regression, inference, model assumption evaluation, the likelihood approach, matrix formulation, generalized linear models, single-factor and multifactor analysis of variance (ANOVA), and a brief foray into nonlinear modeling. Carries out applied analysis in a statistical computing environment.

BTRY 3100 Statistical Sampling (also ILRST/STSCI 3100)

Fall. 4 credits. Prerequisites: two semesters of statistics. Applied methodology and theory of statistical sampling, with particular emphasis on sampling methods, sample design, cost, estimation of population quantities, and error estimation. Assessment of nonsampling errors. Discussion of application to social and biological sciences and business. Includes an applied project.

BTRY 4070 Principles of Probability and Statistics (also ILRST 4070)

Fall. 4 credits. Cannot be taken for credit after completion of BTRY 4080/4090 or MATH 4710/4720 sequence. Prerequisites: one year of calculus. Course is prerequisite for upper-division statistical genomics courses. Recommended: some knowledge of multivariate calculus and statistics. S-U or letter grades. A one-semester version of the BTRY 4080/4090 sequence. Topics include combinatorial probability, conditional probability and independence, random variables (and their moments), standard distributions (multinomial, Poisson, normal, gamma, beta, etc.) and their properties. The second half of the course focuses on parametric inference using maximum likelihood and Bayesian approaches. Computational methods are emphasized using the R programming language. The course is a prerequisite for upper-division statistical genomics courses.

BTRY 4080 Theory of Probability (also STSCI 4080)

Fall. 4 credits. Prerequisites: MATH 1110, 1120, at least concurrent enrollment in 2130 or 2220 or equivalents. Recommended: at least one introductory course in statistical methods. Introduction to probability theory: axiomatic foundations; combinatorics and equally likely events; conditional probability and independence; discrete and continuous random variables, their distributions and moments; generating functions; transformations; extensions to problems involving two or more random variables;

random samples. Can serve as either one-semester introduction or a foundation for a course in statistical theory.

BTRY 4090 Theory of Statistics (also STSCI 4090)

Spring. 4 credits. Prerequisites: BTRY 4080 or equivalent and at least one introductory statistics course.

Introduction to classical theory of parametric statistical inference that builds on the material covered in BTRY 4080. Topics include sampling distributions, principles of data reduction, likelihood, parameter estimation, hypothesis testing, interval estimation, and basic asymptotic theory.

BTRY 4100 Multivariate Analysis (also ILRST/STSCI 4100)

Spring. 4 credits. Prerequisites: BTRY 3010, some knowledge of matrix algebra. S-U or letter grades.

Application of classical multivariate methods to data from a variety of fields using a statistical software package. Topics include the multivariate normal distribution, multivariate regression, and MANOVA; principal components and factor analysis; canonical correlation; discriminant analysis and clustering.

[BTRY 4790 Probabilistic Graphical Models (also CS 4782)]

Fall. 4 credits. Prerequisites: probability theory (BTRY 4080 or equivalent), programming and data structures (CS 2110 or equivalent). Recommended: course in statistical methods (BTRY 4090 or equivalent). Next offered 2010–2011.

A thorough introduction to graphical models, a flexible and powerful framework for machine learning and probabilistic modeling that combines graph theory and probability theory.]

BTRY 4820 Statistical Genomics

Fall. 4 credits. Prerequisites: MATH 1110 and BTRY 4070. Highly recommended: at least one previous course in statistical methods and one in biology. S-U or letter grades.

A course on the statistical analysis of genetic, molecular, and genomic data. The first module of the course presents a thorough treatment of important probability distributions and the concepts of likelihood and Bayesian inference. We then focus on how statistical models are developed for linkage analysis, basic Quantitative Trait Locus mapping, analysis of pedigrees, molecular population genetics and genomics, and phylogenetic inference.

BTRY 4830 Quantitative Genomics and Genetics

Spring. 4 credits. Prerequisites: BTRY 4070 and introductory statistics or equivalent. S-U or letter grades.

A rigorous treatment of analysis techniques used to understand complex genetic systems. This course will cover both the fundamentals and advances in statistical methodology used to analyze disease, agriculturally relevant, and evolutionarily important phenotypes. Topics will include mapping quantitative trait loci (QTLs), application of microarray and related genomic data to gene mapping, and evolutionary quantitative genetics. Analysis techniques will include association mapping, interval mapping, and analysis of pedigrees for both single and multiple QTL models. Application of classical inference and Bayesian analysis approaches will be covered

and there will be an emphasis on computational methods. Meets concurrently with BTRY 6830.

BTRY 4840 Computational Genomics

Fall. 4 credits. Prerequisites: BTRY 4070 and at least one course in statistical methods and at least one in algorithms. S-U or letter grades.

A rigorous treatment of important computational principles and methods for the analysis of genomic data, emphasizing comparative and evolutionary genomics. Topics include sequence alignment, gene and motif finding, phylogeny reconstruction, and inference of gene regulatory networks. Covers both maximum likelihood and Bayesian principles, and both exact and approximate algorithms for inference. Draws heavily on general concepts from probabilistic graphical models. Meets concurrently with BTRY 6840.

BTRY 4940 Undergraduate Special Topics in Biometry and Statistics

Fall or spring. 1–3 credits. S-U or letter grades.

Course of lectures selected by the faculty. Because topics usually change from year to year, this course may be repeated for credit.

BTRY 4970 Undergraduate Individual Study in Biometry and Statistics

Fall and spring. 1–3 credits. S-U or letter grades. Students must register using independent study form (available in 140 Roberts Hall).

Consists of individual tutorial study selected by the faculty. Because topics usually change from year to year, this course may be repeated for credit.

BTRY 4980 Undergraduate Supervised Teaching

Fall and spring. 1–3 credits. S-U or letter grades. Students must register using independent study form (available in 140 Roberts Hall).

Students assist in teaching a course appropriate to their previous training. Students meet with a discussion or laboratory section and regularly discuss objectives with the course instructor.

BTRY 4990 Undergraduate Research

Fall or spring. 1–3 credits. Prerequisite: statistics and biometry undergraduates; permission of faculty member directing research. S-U or letter grades. Students must register using independent study form (available in 140 Roberts Hall).

BTRY 6010 Statistical Methods I (also ILRST 6100)

Fall. 4 credits. Prerequisite: graduate standing or permission of instructor.

Develops and uses statistical methods to analyze data arising from a wide variety of applications. Topics include descriptive statistics, point and interval estimation, hypothesis testing, inference for a single population, comparisons between two populations, one- and two-way analysis of variance, comparisons among population means, analysis of categorical data, and correlation and regression analysis. Introduces interactive computing through statistical software. Emphasizes basic principles and criteria for selection of statistical techniques.

BTRY 6020 Statistical Methods II

Spring. 4 credits. Prerequisite: graduate standing or permission of instructor; BTRY 6010 or equivalent.

Continuation of BTRY 6010. Emphasizes the use of multiple regression analysis, analysis of variance, and related techniques to analyze data in a variety of situations. Topics include an introduction to data collection techniques; least squares estimation; multiple regression; model selection techniques; detection of influential points, goodness-of-fit criteria; principles of experimental design; analysis of variance for a number of designs, including multi-way factorial, nested, and split plot designs; comparing two or more regression lines; and analysis of covariance. Emphasizes appropriate design of studies before data collection, and the appropriate application and interpretation of statistical techniques. Practical applications are implemented using a modern, widely available statistical package.

BTRY 6030 Statistical Methods III: Categorical Data (also ILRST/STSCI 4110)

Spring. 4 credits. Prerequisite: BTRY 6010 and 6020 or permission of instructor.

Offered alternate years.

Categorical data analysis, including logistic regression, log-linear models, stratified tables, matched pairs analysis, polytomous response, and ordinal data. Applications in biomedical and social sciences.

BTRY 6040 Statistical Methods IV: Applied Design (also STSCI 4120)

Spring. 4 credits. Prerequisites: BTRY 6010 and 6020 or permission of instructor.

Applications of experimental design including such advanced designs as split plots, incomplete blocks, fractional factorials. Stresses use of the computer for both design and analysis, with emphasis on solutions of real data problems.

BTRY 6070 Principles of Probability and Statistics

Fall. 4 credits. Prerequisite: one year of calculus. Recommended: some knowledge of multivariate statistics. S-U or letter grades.

For description, see BTRY 4070.

[BTRY 6150 Applied Functional Data Analysis]

Fall. 3 credits. Prerequisites: BTRY 6010 and 6020 or permission of instructor. Next offered 2010–2011.

Functional data analysis studies data that may be thought of as continuously sampled smooth curves. The course focuses on extensions of standard statistical techniques to these data.]

BTRY 6520 Computationally Intensive Statistical Inference

Spring. 4 credits. Prerequisite: ORIE 6700 and at least one course in probability. S-U or letter grades. Offered alternate years.

Modern applications in statistics often require intensive computation not handled by “off-the-shelf” software. This course covers topics in statistical computing, including numerical optimization and finding zeros (likelihood and related techniques including generalized estimating equations and robust estimation), kernel density estimation, resampling methods (randomization and bootstrap tests and confidence intervals), and statistical simulation (random number generation, heuristic search methods, Bayesian estimation, and Monte Carlo Markov Chain methods for tests and interval estimation). Programming is done in MATLAB. Focuses on the use of numerical analysis methods for

solving problems in statistical inference and estimation.

[BTRY 6790 Probabilistic Graphical Models (also CS 6782)]

Fall. 4 credits. Prerequisites: probability theory (BTRY 4080 or equivalent), programming and data structures (CS 2110 or equivalent). Recommended: course in statistical methods (BTRY 4090 or equivalent). Next offered 2010-2011.

For description, see BTRY 4790.]

BTRY 6820 Statistical Genomics

Fall. 4 credits. Prerequisites: MATH 1110 and BTRY 6070. Highly recommended: at least one previous course in statistical methods and one in biology. S-U or letter grades.

For description, see BTRY 4820.

BTRY 6830 Quantitative Genomics and Genetics

Spring. 4 credits. Prerequisites: BTRY 4070 and introductory statistics course or equivalent. S-U or letter grades.

For description, see BTRY 4830.

BTRY 6840 Computational Genomics

Fall. 4 credits. Prerequisites: BTRY 4070 and at least one previous course in statistical methods and at least one in algorithms. S-U or letter grades.

For description, see BTRY 4840.

BTRY 6890 Topics in Population Genetics and Genomics

Fall. 1 credit; may be repeated for credit. Prerequisite: BTRY 6820 or permission of instructor.

This course is a graduate seminar on current topics in population genetic data analysis. Topics this semester may include detecting signatures of natural selection, estimating demographic parameters, and recombination rate variation from whole-genome data; statistical methods for association mapping; efficient methods for disease gene mapping; use of comparative genomic data for population genetic inference. Readings will be chosen primarily from current literature.

BTRY 6940 Graduate Special Topics in Biometry and Statistics

Fall or spring. 1-3 credits. S-U or letter grades.

Course of lectures selected by the faculty. Because topics usually change from year to year, this course may be repeated for credit.

BTRY 6970 Individual Graduate Study in Biometry and Statistics

Fall, spring, or summer. 1-3 credits. S-U or letter grades.

Individual tutorial study selected by the faculty. Because topics usually change from year to year, this course may be repeated for credit.

[BTRY 7170 Theory of Linear Models

Fall. 3 credits. Prerequisites: BTRY 4090, 6020, or equivalents. S-U or letter grades. Next offered 2010-2011.

Properties of the multivariate normal distribution. Distribution theory for quadratic forms. Properties of least squares and maximum likelihood estimates. Methods for fixed-effect models of less than full rank. Analysis of balanced and unbalanced mixed-effects models. Restricted maximum likelihood estimation. Some use of software packages and illustrative examples.]

BTRY 7180 Generalized Linear Models

Fall. 3 credits. Prerequisites: primarily for Ph.D. students in statistics; BTRY 6020, BTRY 4090, or equivalent. S-U or letter grades.

A theoretical development of generalized linear models and related topics including generalized estimating equations, and generalized linear mixed models.

BTRY 7200 Topics in Computational Genomics

Spring. 1 credit. Prerequisite: BTRY 4840/6840 or permission of instructor. Weekly seminar series on recent advances in computational genomics. A selection of the latest papers in the field will be read and discussed. Methods will be stressed, but biological results and their significance will also be addressed.

BTRY 7210 Topics in Quantitative Genomics

Fall. 1 credit. Prerequisites: BTRY 4830/6830 or permission of instructor. Weekly seminar series on recent advances in quantitative genomics. A selection of the latest papers in the field will be read and discussed. Methods will be stressed, but biological results and their significance will also be addressed.

[BTRY 7270 Advanced Survival Analysis

Spring. 3 credits. Prerequisites: at least one graduate-level course in probability, mathematical statistics, and regression modeling. S-U or letter grades. Next offered 2010-2011.

This course focuses on the rigorous development of nonparametric, semiparametric, and parametric modeling and statistical inference procedures appropriate for analyzing right censored data.]

BTRY 7900 Graduate-Level Dissertation Research

Fall or spring. 1-9 credits. Prerequisite: Ph.D. candidates; permission of graduate field member concerned. S-U grades only. Research at the Ph.D. level.

BTRY 7950 Statistical Consulting

Fall and spring. 2-3 credits. Pre- or corequisites: BTRY 6020 and 4090 and permission of instructor. S-U or letter grades.

Participation in the Cornell Statistical Consulting Unit (CSCU): faculty-supervised statistical consulting with researchers from other disciplines. Discussion sessions are held for joint consideration of literature and selected consultations encountered during previous weeks.

BTRY 7980 Graduate Supervised Teaching

Fall and spring. 2-4 credits. Prerequisites: permission of instructor and chair of special committee plus at least two advanced courses in statistics and biometry. S-U grades only. Students assist in teaching a course appropriate to their previous training. Students meet with a discussion section, prepare course materials, and assist in grading. Credit hours are determined in consultation with the instructor, depending on the level of teaching and the quality of work expected.

BTRY 8900 Master's-Level Thesis Research

Fall or spring. 1-9 credits. Prerequisite: M.S. candidates; permission of graduate field member concerned. S-U grades only. Research at the M.S. level.

BTRY 9900 Doctoral-Level Dissertation Research

Fall or spring. 1-9 credits. S-U grades only.

COMMUNICATION

G. K. Gay, chair; K. L. Berggren, J. P. Birnholtz, S. E. Byrne, S. R. Fussell, T. L. Gillespie, D. A. Grossman, J. T. Hancock, L. M. Humphreys, L. C. Levitan, B. V. Lewenstein, K. A. McComas, P. L. McLeod, S. M. Nelson, J. D. Niederdeppe, C. W. Scherer, M. A. Shapiro, L. P. Van Buskirk, Y. C. Yuan

COMM 1101 Cases in Communication (SBA)

Fall. 3 credits. T. Gillespie. Through analysis of cases, this course introduces students to key principles and theories in the study of human communication. Cases cover personal situations, entertainment, national crises, business situations, new technologies, and other contexts. The goal is to understand the links between these daily activities, "mid-range" theories of human behavior, and broad social concepts of modernity and post-modernity.

COMM 1300 Visual Communication (SBA)

Spring. 3 credits. C. Scherer. Introduction to visual communication theory. Examines how visuals influence our attention, perspectives, and understanding. Uses examples of visuals drawn from advertising, TV news, documentaries, entertainment movies, print, and interactive media to develop a theoretical framework for becoming more visually aware and for thinking more critically about how visuals influence us.

COMM 1310 Writing about Communication

Spring. 3 credits. Corequisite: COMM 1300. L. Van Buskirk and staff. Students develop skill in various writing styles and genres. This course explores communication practices and theories as they are observed and studied in personal and professional contexts. Assignments polish students' ability to gather information, analyze information, integrate ideas about communication, and express those ideas clearly and cogently. Several assignments focus on visual communication theories explored in COMM 1300 as well as ideas from COMM 1101.

COMM 2010 Oral Communication

Fall, winter, spring, or summer. 3 credits. Limited to 24 students per sec (fall and spring) or 15 students per sec (summer). Priority given to juniors and seniors, then sophomores. Fluency in spoken English assumed. Sections meet beginning first day of instruction; may precede lecture. Students absent twice during first week of class are dropped from course roster. Enrolled students must drop by end of second week to allow wait-listed students to add course. K. Berggren and staff.

Through theory and practice, students develop self-confidence and competence in researching, organizing, and presenting material to audiences. Students give four graded speeches, write short papers, perform speaker evaluations, and engage in other speech-related activities.

COMM 2030 Argumentation and Debate
Fall, spring, and summer. 3 credits.
S. Nelson.

Students learn the principles of argumentation and debate. Topics emphasize Internet database research, synthesis of collected data, policy analysis of evidentiary quality, refutation of counter claims, identification of logical fallacies, risk evaluation, framing of issues, and coherent storytelling. Prepares students to work with a great range of opinion and evidence. Emphasizes different viewpoints, including those of different cultures. Assumptions are interrogated.

COMM 2200 Media Communication (SBA)

Fall. 3 credits. S. Byrne.
Introduction to media history, industry, content, policy, process, and effects.

COMM 2450 Communication and Technology (also INFO 2450) (SBA)

Fall. 3 credits. J. Hancock and J. Birnholtz.
This course introduces students to the Communication and Information Technologies focus area of the communication department and the Human Systems track for information science. It examines several approaches to understanding technology and its role in human behavior and society. Topics include psychological aspects of computer-mediated communication; how design plays a role in the way we interface with technology and collaborate with each other; and the ways in which communication technology is situated inside social and institutional structures and cultural formations.

COMM 2630 Organizational Writing

Fall, winter, spring, or summer. 3 credits.
Limited to 25 students per sec.
Prerequisite: junior, senior, or graduate standing; college-level writing course.
L. Van Buskirk and staff.

Students write from the point of view of various organizations, including businesses, government agencies, and nonprofit organizations. This course emphasizes appropriate representation of the writer's organization, audience analysis, and clear and effective written presentation of detailed content. Assignments include text for web sites, reports, proposals, memoranda, letters, and e-mail.

COMM 2720 Principles of Public Relations and Advertising

Winter and summer. 3 credits. Not open to freshmen. Staff.
Survey of the fields of public relations and advertising. Describes organizations, jobs, and functions in the industry. Covers the roles of public relations and advertising in society, the economic system, and organizations; psychological and sociological principles as bases for appeals; strategies for media selection and message execution. Introduction to research and regulation.

COMM 2760 Persuasion and Social Influence (SBA)

Spring. 3 credits. Prerequisite: COMM 1101. P. McLeod.

Social influence and persuasion are the most basic and important functions of communication. The course covers characteristics of persuasive messages, message sources, and targets; interpersonal influence; influence in groups, organizations, and institutions. Special emphasis is given to topics in health, science, risk, media, and technology. This course is taught with a case-study format with strong emphasis on class attendance and participation. Supplementing the cases are interactive lectures and in-class activities and demonstrations. A semester-long field research project done in groups is a major component of the course. Exams and short individual homework assignments are also part of the student evaluation.

COMM 2820 Research Methods in Communication Studies (SBA)

Spring. 3 credits. Pre- or corequisite: sophomore standing. J. Niederdeppe.
The course covers social scientific methods to solve communication research problems empirically. Topics include basic principles of social scientific research, random sampling, questionnaire design, experimental research design, focus group techniques, content analysis, and basic descriptive and inferential statistics. Students will also learn basic data manipulation, presentation, and analysis techniques using SPSS and EXCEL.

COMM 2840 Sex, Gender, and Communication (also FGSS 2840) (SBA)

Fall. 3 credits. Not open to freshmen.
L. Van Buskirk.
Explores the personal, career, social, and economic implications of male and female gender categories. Topics include theories of male and female gender construction, self-identity, social structures, personal relationships, and gender concerns in the workplace. The course devotes equal time to men and to women and focuses on important contemporary communication issues.

COMM 2850 Communication, Environment, Science, and Health (also STS 2851) (SBA)

Spring. 3 credits. B. Lewenstein and staff.
Environmental problems, public health issues, scientific research—in each of these areas, communication plays a fundamental role. From the mass media to individual conversations, from technical journals to textbooks, from lab notes to the web, communication helps define scientifically based social issues and research findings. This course examines the institutional and intellectual contexts, processes, and practical constraints on communication in the life sciences.

[COMM 3010 Speech Communication in Context

Fall and spring. 3 credits. Prerequisite: COMM 2010; second-semester sophomore, junior, or senior standing. Staff.
This course introduces students to advanced theories of speech communication and then demonstrates the uses of these theories in several different contexts, including business and professional, small groups, interpersonality, and intercultural settings. Grades are based on a combination of in-class presentation, tests, and a final paper.]

COMM 3030 Speech and Debate Practicum

Fall and spring. 2 credits. Prerequisite: Program in Speech and Debate members; permission of instructor; completion of one year in program. Travel fee: \$200.
S. Nelson and staff.

Students learn how to prepare for CEDA (Cross Examination Debate Association) debate, Lincoln-Douglas debate, or individual speaking events. The class is divided into four groups according to level of experience; therefore, it may be repeated to a maximum of 8 credits.

COMM 3100 Communication and Decision Making in Groups (SBA)

Spring. 3 credits. Prerequisite: junior or senior standing; priority given to COMM majors. P. McLeod.

This course will provide students with a greater understanding of information sharing, persuasion, and decision development in small work groups. Through practical exercises, class discussions, and lectures, students will learn firsthand how tools such as decision structuring process can affect group performance. The course will be taught in an interactive hands-on format that emphasizes application of tested theory.

COMM 3200 New Media and Society (also INFO 3200) (CA)

Spring. 3 credits. T. Gillespie.
This course builds on mass communication research and the study of culture and technology to investigate the social, political, and technological dynamics of contemporary media. We investigate how new media frame our experience of the world and shape our political involvement in it, and how new media intersect with our sense of identity and involvement in culture.

COMM 3300 Media and Human Development (SBA)

Spring. 3 credits. Prerequisite: COMM 2200. S. Byrne.
Provides a developmental perspective on how children and adolescents interact with, interpret, and respond to media content. Major areas of consideration include the effects of media violence, health and pro-social messages, educational programming, advertising, video games, sexual media, and content children find frightening. Students will evaluate the strategies that have been proposed to mitigate negative effects of the media on children.

[COMM 3400 Psychology of Social Computing (also INFO 3400) (SBA)

Fall. 3 credits. Prerequisite: COMM/INFO 2450. J. Birnholtz.
Course focuses on understanding online communication through principles of cognitive and social psychology and aspects of the Internet that defy traditional psychology understandings. Topics include impression formation and management, deception and trust, group dynamics, social support, "Internet addiction," online pornography, and organizational impacts of new communication technology.]

COMM 3450 Human-Computer Interaction Design (also INFO 3450) (SBA)

Fall. 3 credits. Pre- or corequisite: COMM/INFO 2450. D. Cosley, F. Guimbretière, and staff.
Gives students insight into the design of computer interfaces and software from the

user's point of view. Students come to understand how hardware and software design influence the interaction between people and computers. Using assigned readings, demonstrations, and projects, students examine issues and trade-offs in interaction design and invent and evaluate alternative solutions.

COMM 3490 Media Technologies (also STS/INFO 3491) (CA)

Spring. 3 credits. Offered odd-numbered years. T. Gillespie.

Our efforts to communicate, share culture, and drive social agendas depend on the tools we've developed. However, our commonplace notions of communication and media regularly overlook the role of the material technologies that are so crucial to them. This course considers the technologies of media (including printing, photography, film, telegraph, telephone, radio, television, and computer networks) as an opportunity to think about the intersection of technology, communication, and its social context.

[COMM 3520 Science Writing for the Mass Media (also STS 3521)

Fall. 3 credits. Limited to 24 students. Not open to freshmen. Prerequisite: college-level writing course. Next offered 2010-2011. B. Lewenstein.

How to write about science, technology, and medicine for the media. Writing assignments focus on writing news for web sites, blogs, magazines, and other media.]

[COMM 3530 Science Writing Practicum

Spring. 1 credit. Prerequisite: COMM/STS 3520, ENGR 3500, or permission of instructor. Next offered 2010-2011. B. Lewenstein.

Students cover the annual meeting of the American Association for the Advancement of Science. Students are responsible for all costs of travel, lodging, and meals.]

[COMM 3551 Computers: From the 17th Century to the Dotcom Boom (also STS 3551)

Fall. 4 credits. Next offered 2010-2011. J. Ratcliff.

For description, see STS 3551.]

COMM 3561 Computing Cultures (also STS 3561)

Spring. 4 credits. R. Prentice.

For description, see STS 3561.

COMM 3600 Writing for New Media: Theory, Analysis, and Practice

Fall and spring. 3 credits. Prerequisites: sophomore standing and at least one college-level writing course. F. Joseph.

This advanced-level writing course emphasizes academic, analytical, and practical writing skills. Students will research and write analyses of texts that appear in new media outlets, including independent wikis and blogs and those linked to conventional journalistic sources. The first three or four class essays will analyze style, content, reliability, and readability of such texts. In the second half of the course, students will write their own blogs and wikis on approved communication and social science topics.

COMM 3650 Technology and Collaboration (also INFO 3650) (SBA)

Spring. 3 credits. Prerequisite: COMM 2450. J. Birnholtz.

Course focuses on understanding the use of communication technologies in groups, with a particular focus on the unique and sometimes difficult issues raised by groups that are geographically distributed. Topics include theories of group and organizational behavior, interpersonal awareness, privacy, trust, technology-mediated communication, and technology evaluation and adoption.

COMM 3760 Planning Communication Campaigns (SBA)

Fall. 3 credits. Pre- or corequisites: COMM 2820 or equivalent social research course and one semester of introductory statistics. J. Niederdeppe.

Provides a theoretical and practical overview of the audiences, messages, and evaluation of communication campaigns. Includes principles of planning and evaluation relevant to several kinds of campaigns. Topics include discussion of campaign goals, objectives, strategies, and tactics; research design and implementation; audience segmentation; message construction; and techniques of evaluation. Considers common methods of data collection (e.g., focus groups, experiments, surveys) and analysis of campaign-related data sources.

[COMM 3980 Issues in Teaching Communication (KCM)

Fall and spring. 1 credit. Pre- or corequisite: junior or senior standing; present or past undergraduate teaching assistant for COMM course. K. Berggren.

Seminar bringing together novice educators to discuss ideas, experiences, and practice. Integration of the theory into actual education efforts is challenging for professional educators. Novice teachers are not aware of their common experiences, much less of a theoretical component to education. In discussions of actual teaching experiences, literature reviews, research reports, textbook chapters, curriculum, and evaluation tools, students examine new ideas and practices. The primary goal of the seminar is to enrich and deepen the novice teaching experience.]

COMM 4050 Speech and Debate in the Community

Fall and spring. 1 credit; may be repeated once for credit. Meets one hour weekly. S. Nelson and staff.

Students share their communication talents in structured experiences in which they design and implement a speech or debate project in local schools or the community.

COMM 4100 Organizational Communication: Theory and Practice (CA)

Spring. 3 credits. Prerequisite: junior, senior, or graduate standing; COMM 1101 or permission of instructor. C. Yuan.

Study of management communication processes in formal organizations. Applies relevant organizational behavior and communication principles in today's business environment; examines formal and informal communication networks.

[COMM 4200 Public Opinion and Social Process (SBA)

Spring. 3 credits. Prerequisite: COMM 2820. Offered even-numbered years. Next offered 2010-2011. Staff.

The course provides a scientific and applied overview of the concept of "public opinion" and its implications for macrosocial processes.]

COMM 4210 Communication and the Environment (SBA)

Spring. 3 credits. Offered odd-numbered years. K. McComas.

Students investigate how values, attitudes, social structure, and communication affect public perceptions of environmental risk and public opinion about the environment. A primary focus is mass media's impact on public perceptions of the environment, how the media portray the environment, and discussion of the implications of public consumption of environmental content.

COMM 4220 Psychology of Entertainment Media (SBA)

Fall. 3 credits. Prerequisites: introductory psychology or COMM 1101 or 2200. M. Shapiro.

Every media format uses entertainment including video games, advertising, television, movies, sports, and news. This course examines the psychology (conscious and unconscious) of entertainment, including why people like entertainment, what makes a story entertaining, how people mentally process entertainment, what makes things frightening or funny, and can entertainment persuade.

COMM 4280 Communication Law

Spring. 3 credits. Prerequisite: junior, senior, or graduate standing or permission of instructor. D. Grossman.

This course deals with the law governing communication media. Topics include First Amendment concepts, restraints on newsgathering and dissemination, libel, invasion of privacy, copyright protection, regulation of broadcast and nonbroadcast electronic media, advertising law, and current legal issues unique to online communication.

COMM 4290 Copyright in the Digital Age (also INFO 4290) (CA)

Fall. 3 credits. Offered odd-numbered years. T. Gillespie.

This course looks at recent legal and cultural battles about digital copyright, to investigate how participation in a digital world is structured: who speaks, what they can say, who hears, and with what consequences. We use these cases to look at the collision of authorship and the market, technology and law, individual and institution, culture and power.

COMM 4400 Advanced Human-Computer Interaction Design (also INFO 4400) (SBA)

Spring. 3 credits. Prerequisite: COMM/INFO 3450 or permission of instructor. D. Cosley, G. Gay, and staff.

Focuses on the design of computer interfaces and software from the user's point of view. The goal is to teach user interface designs that "serve human needs" while building feelings of competence, confidence, and satisfaction. Topics include formal models of people and interactions, collaborative design issues, psychological and philosophical design considerations, and cultural and social issues.

COMM 4450 Seminar in Computer-Mediated Communication (also INFO 4450) (SBA)

Spring. 3 credits. Prerequisite: COMM/INFO 2450. S. Fussell.

Focuses on reading and evaluating the theories and research methodologies used to investigate communication via computer systems. Assignments include student

collaborations using electronic conferencing and other advanced communication technologies, as well as reflections on and evaluations of these collaborations in light of current theories and research findings. Topics include virtual teams, videoconferencing, and others as they emerge.

COMM 4500 Language and Technology (also INFO 4500) (SBA)

Spring. 3 credits. J. Hancock and staff. Examines how new communication technologies affect the way we produce and understand language and modify interaction with one another. Focuses on the collaborative nature of language use and how Internet technologies affect the joint activities of speakers and listeners during the construction of meaning in conversation.

[COMM 4560 Community Involvement in Environmental Decisions (SBA)]

Spring. 3 credits. Prerequisite: junior or senior standing or permission of instructor. Offered odd-numbered years. K. McComas.

Community involvement is an essential part of environmental decision making, but it is also one of the most challenging aspects of the decision-making process. Through selected readings and course activities, this class will examine both traditional and contemporary methods of community involvement. When evaluating the methods, the class will discuss how social structures work to define criteria for success.]

COMM 4650 Mobile Communication in Public Life (CA)

Fall. 3 credits. Prerequisites: COMM/INFO 2450. L. Humphreys.

Mobile technology is an increasingly prominent tool for modern communication. This course will critically explore the role of mobile communication and its impact on public life. The course is divided into three main areas: social and political uses of mobile communication, mobility and sense of place, and mobile social software.

COMM 4660 Public Communication of Science and Technology (also STS 4661) (SBA)

Spring. 3 credits. Prerequisite: COMM 2850, or 3520, ENGR 3500, or permission of instructor. Offered even-numbered years. B. Lewenstein.

Explores the structure, meanings, and implications of "public communication of science and technology" (PCST). Examines the contexts in which PCST occurs, looks at motivations and constraints of those involved in producing information about science for nonprofessional audiences, and analyzes the functions of PCST. Ties existing ideas about PCST to general communication research, and leads to developing new knowledge about PCST. Format is primarily seminar/discussion.

COMM 4860 Risk Communication (SBA)

Fall. 3 credits. C. Scherer.

Examination of theory and research related to the communication of scientific information about environmental, agricultural, food, health, and nutritional risks. Concentrates on social theories related to risk perception and behavior. Examines case studies involving pesticide residues, waste management, water quality, environmental hazards, and personal health behaviors. Emphasizes understanding, applying, and developing theories.

COMM 4940 Special Topics in Communication

Fall, spring, or summer. 1–3 credits, variable. Prerequisite: permission of instructor. S–U or letter grades.

Study of topics in communication not otherwise provided by a department course and determined by the interest of the faculty and students.

COMM 4960 Communication Internship

Fall or spring. Work component and variable. 1 credit; may be repeated once for a total of 2 credits. Prerequisite: COMM major or minor (first-, second-, third-, or fourth-year) for 1 credit (minimum 60 hours). K. Berggren.

Students receive a structured, on-the-job learning experience under the supervision of communication professionals in cooperating organization. A minimum of 60 hours of on-the-job work is required; the number of work hours beyond 60 is left to the discretion of the intern and the supervising company. A final paper linking communication theory to practical work experience is required. All internships must be approved before the work experience segment by the internship coordinator. All 4960 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

COMM 4970 Individual Study in Communication

Fall or spring. 1–3 credits; may be repeated to 6 credits with different supervising faculty member. Prerequisite: 3.0 GPA. Students must register using independent study form (available in 140 Roberts Hall).

Individual study under faculty supervision. Work should concentrate on locating, assimilating, synthesizing, and reporting existing knowledge on a selected topic. Attempts to implement this knowledge in a practical application are desirable.

COMM 4980 Communication Teaching Experience

Fall or spring. 1–3 credits; may be repeated to 6 credits with different courses. Intended for undergraduates desiring classroom teaching experience. Prerequisite: junior or senior standing; 3.0 GPA (2.7 if teaching assistant for skills development course); permission of faculty member who supervises work and assigns grade. Students must register using independent study form (available in 140 Roberts Hall).

Periodic meetings with the instructor cover realization of course objectives, evaluation of teaching methods, and student feedback. In addition to aiding with the actual instruction, each student prepares a paper on some aspect of the course.

COMM 4990 Independent Research

Fall or spring. 1–3 credits; may be repeated to 6 credits. Prerequisites: senior standing; 3.0 GPA. Students must register using independent study form (available in 140 Roberts Hall).

Permits outstanding students to conduct laboratory or field research in communication under appropriate faculty supervision. The research should be scientific: systematic, controlled, empirical. Research goals should include description, prediction, explanation, or policy orientation and should generate new knowledge.

COMM 4991 Independent Honors Research in Social Science

Fall or spring. 1–6 credits. Prerequisite: undergraduate standing; requirements met for honors program. Staff.

Intended for students pursuing the research honors thesis in communication. Students must complete the CALS Honors program application by the third week of the fall semester of their senior year. Students should select a faculty advisor and begin proposal development during their junior year.

COMM 5660 Workshop in Science Communication for Scientists

Spring. 2 credits. Prerequisite: graduate standing. B. Lewenstein.

This workshop will train researchers in the sciences (including natural sciences, engineering, experimental social sciences, etc.) to communicate effectively with non-scientists such as policy makers, political stakeholders, the media, and the general public. Training activities may include role-play, reading/discussion, writing press releases and other outreach materials, and discussion with invited speakers. Outside of the regularly scheduled time, additional activities may include field trips to newsrooms and a training session with a professional media trainer.

COMM 6100 Seminar in Social Networks

Fall. 4 credits. Prerequisite: graduate standing. Offered even-numbered years. C. Yuan.

Examination of the structures and processes of group, organizational, and social networks. Review of research literature in communication and social networks. Survey of network methods with an emphasis on quantitative analysis using relevant software. Application of graph theory, matrix algebra, and sociometry techniques. Analysis and social interpretation of extant network datasets.

COMM 6180 Media Influence and Persuasion

Spring. 3 credits. Prerequisite: graduate standing. Offered odd-numbered years. S. Byrne.

This graduate seminar covers classic, influential, and disruptive theories of media influence and mediated persuasion. Readings include cutting-edge empirical tests of those theories across communication contexts. Students develop skills in operationalizing theoretical concepts in preparation for empirical test.

COMM 6210 Advanced Communication and the Environment

Spring. 3 credits. Offered odd-numbered years. K. McComas.

Students investigate how values, attitudes, social structure, and communication affect public perceptions of environmental risk and public opinion about the environment. A primary focus is mass media's impact on public perceptions of the environment, how the media portray the environment, and discussion of the implications of public consumption of environmental content. Lectures concurrent with COMM 4210; graduate students should enroll in COMM 6210.

COMM 6220 Advanced Psychology of Entertainment Media

Fall. 3 credits. Prerequisites: graduate standing and permission of instructor. M. Shapiro.

Graduate seminar examining the psychology (conscious and unconscious) of entertainment media (including video games, advertising, television, movies, sports, and news). Specific topics examined will vary. Depending on preparation, students may be asked to attend COMM 4220 lectures and take exams.

COMM 6400 Human-Computer Interaction Design (also INFO 6400)

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor.
D. Cosley, G. Gay, and staff.

Graduate-level readings and research supplementing COMM/INFO 4400. Focuses on the design of computer interfaces and software from the user's point of view. The goal is to teach user interface designs that "serve human needs" while building feelings of competence, confidence, and satisfaction. Topics include formal models of people and interactions, collaborative design issues, psychological and philosophical design considerations, and cultural and social issues.

COMM 6450 Seminar in Computer-Mediated Communication (also INFO 6450)

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor.
S. Fussell.

Graduate-level readings and research supplementing COMM/INFO 4450. Through close reading and research in communication and technology, and participation in projects using these technologies, students enhance experiential, theoretical, and critical understanding of contemporary computer-mediated communication systems and uses. Topics include virtual teams, videoconferencing, and others.

COMM 6500 Language and Technology (also INFO 6500)

Spring. 3 credits. J. Hancock and staff. Graduate-level readings and research supplementing COMM/INFO 4500. Examines how new communication technologies affect the way we produce and understand language and modify interaction with one another. Focuses on the collaborative nature of language use and how Internet technologies affect the joint activities of speakers and listeners during the construction of meaning in conversation.

COMM 6660 Public Engagement in Science (also STS 6661)

Spring. 3 credits. Offered even-numbered years. B. Lewenstein.

In recent years, the scientific community has increasingly referred to "public engagement in science." This seminar explores the scholarly literature addressing that move; the links between "public engagement" and earlier concerns about sciences literacy, public understanding of science, and outreach; and the intersections between literature in communication and in science studies on issues involving the relationships among science(s) and public(s).

COMM 6760 Public Health Communication

Spring. 3 credits. Prerequisite one graduate-level research methods course. Offered even-numbered years.
J. Niederdeppe.

This graduate course provides an overview of theory and research on public communication related to health behavior and policy change. Topics include theories of behavior change

and message effects; formative and evaluative research; campaigns related to cancer, AIDS, obesity, smoking, nutrition, and drug use; and heterogeneity in campaign effects between populations.

COMM 6800 Studies in Communication

Fall. 3 credits. Prerequisite: communication graduate students or permission of instructor. S. Fussell.

Reviews classical and contemporary readings in communication, including key concepts and areas of investigation. Explores the scope of the field, the interrelationships of its various branches, and examines the role of theory in the research process.

COMM 6810 Advanced Communication Theory

Spring. 3 credits. Prerequisite: COMM 6800 or graduate standing and permission of instructor. M. Shapiro.

Development of, and contemporary issues in, communication theory. Discusses the interaction between communication and society, social groupings, and mental processing.

COMM 6820 Methods of Communication Research

Fall. 3 credits. Recommended: familiarity with basic statistical concepts. J. Birnholz. Analyzes methods of communication research based on a social science foundation. Goals will be to understand processes and rationales for qualitative, textual, survey, and experimental methods and to experience each method through modest individual or group research projects. Critiques of selected contemporary communication studies.

COMM 6830 Qualitative Research Methods in Communication

Spring. 3 credits. Prerequisite: COMM 6820 and graduate standing. L. Humphreys.

Course will review qualitative methods used in communication research, including interviews, focus groups, fieldwork (ethnography), and case studies. Students will practice the various methods so they can learn to apply them to their own research. Course will also discuss how researchers analyze qualitative data and build theories from their observations.

COMM 6840 Theory and Research in Group Communication and Decision Making

Fall. 3 credits. Offered odd-numbered years. P. McLeod.

This graduate seminar will focus on theory and research in communication and decision-making in small groups. Emphasis will be on task-oriented groups. Topics will include information exchange, decision-making processes, types of tasks, social influence, group development processes, group support systems, intergroup processes, and leadership. Special attention will be given to methodological challenges in group research.

[COMM 6860 Risk Communication

Spring. 3 credits. Next offered 2010-2011.
K. McComas and C. Scherer.

Examination of theory and research related to the communication of scientific information about environmental, agricultural, food, health, and nutritional risks.]

COMM 6910 Seminar: Topics in Communication

Fall and spring. 0 credits. Staff.

Scholars from a wide variety of fields present varied topics in theory or research as it relates to communication.

COMM 6940 Special Topics in Communication

Fall, spring, or summer. 1-3 credits, variable. Prerequisite: permission of instructor.

Study of topics in communication not otherwise provided by a department course and determined by the interest of faculty members and students.

COMM 6950 Structural Equation Modeling Techniques in Social Science Research

Spring. 3 credits. Prerequisite: course in multiple regression; graduate standing.
C. Yuan.

This is an advanced research methods class for graduate students in the social sciences with an emphasis on data analysis using structural equation modeling (SEM). The class will cover both its basic principles and practical applications (e.g., multi-group models, growth curve models) using LISREL/PRELIS software.

COMM 7810 Seminar in Psychology of Communication

Spring. 3 credits. Prerequisite: COMM 6800 and 6810 or equivalent graduate-level theory in psychology or social psychology. Offered odd-numbered years.
M. Shapiro.

Discusses and analyzes selected current issues in the psychology of communication. Students discuss and synthesize current research and theory in the mental processing of communication.

COMM 7940 Seminar in Communication Issues

Fall, spring, or summer. 1-3 credits. Prerequisite: permission of instructor.

Small group study of topical issue(s) in communication not otherwise examined in a graduate field course.

COMM 7970 Graduate Independent Study

Fall, spring, or summer. 1-3 credits. Prerequisite: permission of instructor.

Individual study concentrating on locating, assimilating, synthesizing, and reporting existing knowledge on a selected topic.

COMM 7980 Communication Teaching Laboratory

Fall and spring. 1-3 credits each semester; may be repeated once. Prerequisite: graduate standing and permission of faculty member who will supervise work and assign grade. (Students must use faculty member's section number to register.) Graduate faculty.

Designed primarily for graduate students who want experience in teaching communication courses. Students work with an instructor in developing course objectives and philosophy, planning, and teaching.

COMM 7990 Graduate Research

Fall, spring, or summer. 1-3 credits. Prerequisite: appropriate communication graduate course work or permission of instructor.

Small-group or individual research based on original, empirical, data-based designs regarding topical issues in communication not otherwise examined in a graduate field course.

COMM 8900 Master's-Level Thesis Research

Fall or spring. 1–6 credits; may be repeated for max. of 6 credits.

Prerequisite: permission of committee chair.

Thesis research for M.S. (communication) students.

COMM 9900 Doctoral-Level Dissertation Research

Fall or spring. 1–9 credits; may be repeated for max. of 9 credits.

Prerequisites: completion of "A" exam; permission of committee chair.

Dissertation research for Ph.D. candidates.

CROP AND SOIL SCIENCES

H. M. van Es, chair (232 Emerson Hall, 255-5459); D. Buckley, J. H. Cherney, W. J. Cox, A. DiTommaso, J. M. Duxbury, G. W. Fick, R. R. Hahn, P. Hobbs, L. V. Kochian, J. Lehmann, M. B. McBride, R. L. Obendorf, J. M. Russell-Anelli, T. L. Setter, J. E. Thies, O. Vatamaniuk, R. M. Welch

Courses by Subject

Crop Science: 2110, 3150, 3170, 4030, 4050, 4140, 4260, 4440, 4551–4555, 6080, 6100, 6120, 6140, 6420, 6941, 7910, 8900, 9910

Environmental Information Science: 3970, 4100, 4110, 4200, 4650, 6200, 6210, 6600, 6740, 6750, 6943, 7920, 8910, 9920

Soil Science: 1120, 2600, 3210, 3620, 3630, 3650, 3720, 4120, 4660, 4720, 4830, 6630, 6660, 6690, 6710, 6720, 6840, 6942, 7900, 8920, 9900

General Courses**CSS 1900 Sustainable Agriculture: Food, Farming, and the Future**

Fall. 3 credits. Limited to 60 students. G. W. Fick.

Designed to introduce basic food production resources in the context of the human aspects of farming. The information is of general value for nonmajors and students new to the field. Several field trips enhance appreciation for the diversity of agriculture.

CSS 2940 Introduction to Agricultural Machinery (also AGSCI/HORT 2940)

Fall. 2 credits. B. Flannigan and A. DiTommaso.

This course is an overview of agricultural machinery used in the production of field crops. Information will be presented in a lecture and field laboratory format, stressing "hands-on" equipment demonstrations and use, particularly of tractors. Successful completion will provide a broad understanding of agricultural machinery operation and design rationale.

CSS 3800 Organic Food and Agriculture (also AGSCI/HORT 3800)

Fall. 3 or 4 credits. Prerequisites: CSS 1900, CSS 2600, HORT 1101

recommended, or permission of instructor.

Discussion of techniques and methods of organic food production, including vegetables, orchard crops, grains and animal systems. Critically evaluates relevant issues that affect the environment, consumers, and the industry. Optional lab includes interaction with experts, field trips to farms, and living laboratory at Dilmun Hill.

CSS 4910 Food, Farming, and Personal Belief (also IARD 4910)

Spring. 1 credit. Recommended: Sustainable Agriculture (CSS 1900) or equivalent. G. Fick.

Reading and discussion course focusing on the relationship between agricultural sustainability and religious faith, especially the linkage between the motivation to adopt practices of sustainability and personal value systems of farmers and consumers. Principles of scientific agriculture are examined with the holistic view of sustainable development.

[CSS 4940 Biotechnology and Development (also GOVT 4300)

Spring. 2 credits. Sec 2. J. E. Thies and R. J. Herring.

Class discussions, presentations, and scholarly and popular articles are used to introduce students to the dominant contentions around biotechnology in the context of international development.]

CSS 4940 Special Topics in Crop and Soil Sciences (undergraduate level)

Fall or spring. 4 credits max.

The department teaches "trial" courses under this number. Offerings vary by semester, and are advertised by the department before the semester begins. Courses offered under this number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

CSS 4970 Individual Study in Crop and Soil Sciences

Fall or spring. 1–6 credits. Students must register using independent study form (available in 140 Roberts Hall).

Topics in soil science, crop science, or environmental information science are arranged at the beginning of the semester for individual study or for group discussions.

CSS 4980 Teaching Experience in Crop and Soil Sciences

Fall or spring. 1–5 credits. Students must register using independent study form (available in 140 Roberts Hall).

Teaching experience in soil science, crop science, or environmental information science is obtained by assisting in the instruction of a departmental course. This course should not be taken by teaching assistants.

CSS 4990 Undergraduate Research

Fall or spring. Credit TBA. Students must register using independent study form (available in 140 Roberts Hall).

Independent research on current problems selected from any phase of crop science, soil science, or environmental information science.

CSS 6900 Scientific Method in Practice

Spring. 1 credit. Prerequisite: junior, senior, or graduate standing. H. G. Gauch, Jr., and G. W. Fick.

Students in this course study Hugh Gauch's book *Scientific Method in Practice*, which is designed to help scientists become better scientists through deeper understanding of common themes that extend across the disciplines. Topics include the history and philosophy of science, reliance on evidence, deductive and inductive logic, probability, parsimony, and hypothesis testing.

CSS 6950 Planning and Reporting Research

Summer, six-week session. 3 credits. P. Hobbs.

This course is designed to help graduate students improve their technical writing skills for various scientific outputs. Students will be guided through written output that includes review articles, scientific papers, thesis, research and funding proposals, manuscripts, and Power Point and slide presentations. The goal will be to increase proficiency in writing that will improve the chances of acceptance of research outputs in good quality, refereed publications. The students will also review ways to present data in tables and figures with proper statistical analysis. Professional ethics in the conduct and communication of science will also be covered. Much of the course will have students using their own research data in preparation of various good quality publications and outputs. Special attention will be given to M.P.S. students who need to complete a problem-solving or applied project.

CSS 6960 Agroecological Perspectives for Sustainable Development

Fall and spring. 1 credit. S–U grades only. L. Buck, L. Fisher, and P. Hobbs.

Agroecological perspectives for sustainable development.

CSS 6970 Seminar in Crop and Soil Sciences

Fall and spring. 1 credit. S–U grades only. H. van Es.

Covers current research and selected topics in the crop and soil sciences and related fields.

CSS 6980 Graduate Teaching or Extension Experience

Fall. 1–12 credits. S–U or letter grades. Staff.

Planning and teaching courses or extension programs under the supervision of departmental faculty. This may include lectures, laboratories, discussion sessions, workshops, in-service training events, etc.

CSS 7970 Graduate Individual Study in CSS

Fall and spring. 1–6 credits.

Crop Sciences**CSS 2110 Field Crop Systems**

Fall. 4 credits. Prerequisite: none. Two to four field trips during lab periods (until 5 p.m. or on weekends). R. L. Obendorf.

Principles of field-crop growth, development and maturation, species recognition, soil and climatic adaptations, tillage systems, liming and mineral nutrition, cropping sequences, management systems, nutrition and health, and crop improvement are considered. Grain, protein, oil, fiber, biofuel and forage crops are emphasized. Laboratory utilizes living plants, extensive crop garden, and computer simulation.

CSS 3150 Weed Biology and Management

Fall. 4 credits. Prerequisite: introductory course in biology or botany.

A. DiTommaso.

Examines principles of weed science. Emphasizes (1) weed biology and ecology; (2) weed-management strategies used in agricultural and natural ecosystems; and (3) chemistry of herbicides in relation to effects on plant growth and the environment. Hands-on laboratory sessions cover weed identification and ecology, crop-weed interactions, herbicide application, selectivity, and symptomatology.

CSS 3170 Seed Science and Technology (also HORT 3170)

Fall. 3 credits. Prerequisite: BIOPL 2410 or equivalent. Two all-day field trips. Next offered 2011-2012. A. G. Taylor, Geneva Experiment Station. (Ithaca contact, R. L. Obendorf.)

The principles and practices involved in the production, harvesting, processing, storage, testing, quality management, certification, and use of high-quality seed from improved cultivars. Information is applicable to various kinds of agricultural seeds. Hands-on laboratory experience.

CSS 4030 Traditional Agriculture in Developing Nations (also IARD 4030)

Fall. 1 credit. S-U grades only. P. Hobbs. Half the world's arable land is farmed by traditional farmers who have produced food and fiber for millennia with few outside inputs. Many of these practices are forgotten but some are still used by farmers in developing countries. This course examines the pros and cons of some of these traditional systems.

CSS 4050 Field Crop Systems

Fall. 4 credits. Prerequisite: none. Two to four field trips during lab periods (until 5 p.m. or on weekends). R. L. Obendorf. Principles of field-crop growth, development and maturation, species recognition, soil and climatic adaptations, tillage systems, liming and mineral nutrition, cropping sequences, management systems, nutrition and health, and crop improvement are considered. Grain, protein, oil, fiber, biofuel, and forage crops are emphasized. Laboratory utilizes living plants, extensive crop garden, and computer simulation. Lab report and term paper on contemporary field crop systems required. Designed for professional students or advanced undergraduates. Credit for both CSS 4050 and CSS 2110 (or CSS 3110) not permitted.

CSS 4130 Physiology and Ecology of Yield

Spring. 3 credits. Prerequisites: coursework in plant physiology or molecular biology or biochemistry, or advanced plant science. T. L. Setter.

Study of processes involved in the conversion of solar energy into harvested plant products and environmental constraints on crop productivity. Topics include photosynthesis and essential processes that utilize photosynthetic energy, including nitrogen assimilation, phloem translocation and partitioning; canopy-scale influences on solar radiation use efficiency; regulation of growth processes in leaf, root, and floral/fruit/grain sinks in response to environment; seed and fruit set; water transport and stomatal regulation; root architecture and function, and behavior in water-limited situation. Examples will be from the full spectrum of crops and model-plant systems. Students will develop an ability to identify processes that could be improved through optimization of crop cultural practices or genetic change.

CSS 4140 Tropical Cropping Systems: Biodiversity, Social, and Environmental Impacts (also IARD 4140)

Fall. 3 credits. Prerequisite: introductory crop science or soil science or biology course or permission of instructor. P. Hobbs.

Characterizes and discusses traditional shifting cultivation; lowland rice-based systems; upland cereal-based systems; smallholder mixed farming including root crops and livestock; plantation fruit and oil crop systems; and agroforestry. In addition to species diversity and domestication, factors such as climate, land quality, soil management, land tenure, labor, and markets are considered. Evaluates the impact of tropical cropping systems on the environment.

CSS 4260 Practicum in Forest Farming as an Agroforestry System (also HORT/NTRES 4260)

Fall. 2 credits. K. W. Mudge, L. E. Buck, and P. Hobbs.

For description, see HORT 4260.

CSS 4440 Integrated Pest Management (also ENTOM 4440)

Fall. 4 credits. Prerequisites: biology course or permission of instructor. J. E. Losey and A. DiTommaso.

For description, see ENTOM 4440.

CSS 4551-4555 Mineral Nutrition of Crops and Landscape Plants (also HORT 4551-4555)

Spring. 5 modules, 1 credit each. Next offered 2011-2012. Coordinator: H. C. Wien.

For description, see HORT 4551-4555.

CSS 6080 Water Status in Plants and Soils

Fall. 1 credit. Prerequisite: permission of instructor. S-U grades only. Next offered 2011-2012. T. L. Setter.

This is a lecture and lab course that introduces students to techniques for field appraisal of the status of water in plants and soil, including methods used in physiological studies, such as the psychrometer, pressure chamber, gas exchange analyzer, soil water content analyzers, sap flow instrumentation, and abscisic acid analysis with ELISA.

[CSS 6100 Physiology of Environmental Stresses

Fall. 3 credits. Prerequisite: course work in plant physiology and/or plant molecular biology or permission of instructor. Next offered 2010-2011. T. L. Setter and O. Vatamaniuk.

Study of the responses of plants to environmental stresses, including drought, high temperature, salinity, chilling, freezing, hypoxia, and toxic elements. Emphasizes the physiological and biochemical basis of injury and plant resistance mechanisms at the whole-plant, cellular, and molecular levels.]

CSS 6120 Seed Biology

Fall. 3 credits. Prerequisite: plant physiology course or permission of instructor. R. L. Obendorf.

Describes the molecular, biochemical, physiological, environmental, and genetic regulation of seed development, maturation, and germination events, including the deposition and mobilization of seed reserves with illustrations from the world's major food and feed seeds. Illustrations extend the principles to practical situations, industrial uses, and food systems for improved health.

[CSS 6140 Weed Ecology and Management

Spring. 3 credits. Prerequisite: CSS 3150 or equivalent. Next offered 2010-2011.

A. DiTommaso.

Examination of plant ecological principles governing weed population dynamics and weed-crop competitive interactions in crop and noncrop ecosystems. Development of sustainable weed management strategies.]

[CSS 6420 Mineral Nutrition: From Plants to Humans (also BIOPL 6420)

Spring. 3 credits. Prerequisite: BIOPL 3410 or equivalent. Next offered 2010-2011.

O. Vatamaniuk, L. V. Kochian, and R. M. Welch.

The course explores the molecular, biochemical, biophysical, and physiological mechanisms of acquisition, translocation, and utilization of mineral nutrients by plants for growth and development.]

CSS 6941 Special Topics in Crop Science

Fall or spring. 1-6 credits. Staff.

Study of topics in crop science that are more specialized or different from other courses. Special topics to be offered depend on staff and student interests.

CSS 7910 Graduate-Level Thesis Research in Crop Science

Fall or spring. Credit TBA. S-U grades only. Graduate faculty.

Thesis research for Ph.D. students before "A" exam has been passed.

CSS 8900 Master's-Level Thesis Research in Crop Science

Fall or spring. Credit TBA. S-U grades only. Graduate faculty.

Thesis research for M.S. candidates.

CSS 9910 Doctoral-Level Dissertation Research in Crop Science

Fall or spring. Credit TBA. S-U grades only. Graduate faculty.

Dissertation research for Ph.D. candidates after "A" exam has been passed.

Environmental Information Science**CSS 3970 Environmental Microbiology (also BIOMI 3970)**

Spring. 3 credits. Prerequisite: BIOMI 2900. Recommended: BIOEE 2610, NTRES 3030, or permission of instructor. Offered alternate even-numbered years. E. L. Madsen.

Discusses the biology, behavior, and function of microorganisms in natural environments in relation to past and present environmental conditions on Earth. Also considers the role of microorganisms in ecologically and environmentally significant processes through discussion of specific topics such as elemental cycles, nutrient cycling, transformation of pollutant chemicals, wastewater treatment, and environmental biotechnology.

CSS 4100 The GMO Debate: Science and Society

Spring. 3 credits. Prerequisite: BIOG 1109 or equivalent. J. Thies and P. Hobbs.

Biotechnology is causing global changes in agricultural production systems. Social movements have arisen to contest the adoption of transgenic or genetically modified organisms. Students will assess the science behind this debate and examine the interplay among science, society, and politics. We introduce the history of the GMO debate, how GMOs are developed, and their potential impacts on agriculture, the environment, and the food system. Social movements contest deployment of biotech products on grounds of food sovereignty, intellectual property,

social justice, and environmental and human health concerns. Scientific evidence is used in a variety of ways in these debates. We integrate concepts from diverse fields to promote understanding of how the use of scientific evidence in social and political contexts impacts the assessment of agricultural biotechnologies.

CSS 4110 Environmental Information Science (also CEE 4110)

Spring. 3 credits. Prerequisite: permission of instructor. S. DeGloria and S. Hoskins. Survey of geo-spatial data and information applied to the science of natural and environmental systems. Experiential approaches emphasize use and integration of maps, spatial databases, aerospace imagery, field data, and the global positioning system (GPS) to discriminate, measure, inventory, and monitor agricultural and environmental resources and processes.

CSS 4200 Geographic Information Systems

Fall. 4 credits. Prerequisite: CSS 4110 or equivalent or permission of instructor. S. DeGloria. Principles and applications of geographic information systems for characterizing and assessing agronomic and environmental systems. Emphasizes accessing, updating, analyzing, and mapping geo-spatial data and information. Considers information needs assessment; spatial data accession; coordinate systems; spatial database design, construction, and maintenance; modeling and analysis; map accuracy assessment; and digital cartography.

[CSS 4650 Global Positioning System

Spring, 3 hrs/wk. 1 credit. Prerequisite: CSS 4110 or 4200, or equivalent, or permission of instructor. S. DeGloria. Introduction to navigation-grade GPS instruments used in agricultural and environmental science. Topics include instrument familiarization; field-data collection and processing; real-time and post-differential correction; and GPS-GIS integration and mapping of geo-positional data.]

[CSS 6200 Spatial Modeling and Analysis

Spring. 3 credits. Prerequisites: CSS 4110 or CSS 4200, or equivalent or permission of instructor. Next offered 2011–2012. S. DeGloria.

Theory and practice of applying geo-spatial data for resource inventory and analysis, biophysical process modeling, and land surveys. Emphasizes use and evaluation of spatial analytical methods applied to agronomic and environmental systems and processes. Laboratory section is used to process, analyze, and visualize geo-spatial data of interest to the student.]

[CSS 6210 Applications of Space-Time Statistics

Spring. 2 credits. Prerequisite: BTRY 6010 or equivalent. S–U grades only. Offered alternate years; next offered 2010–2011. H. Van Es.

Introduction to space-time statistics with applications in agriculture and environmental management. Topics include geostatistics, temporal statistics, sampling, experimental design, state-space analysis, data mining, and fuzzy logic. Focuses on landscape-scale processes and a user's perspective.]

CSS 6600 Remote Sensing Fundamentals (also CEE 6100)

Fall. 3 credits. Prerequisite: permission of instructor. W. D. Philpot. Introduction to the principles, equipment, and methods used in obtaining information about earth resources and the environment from aircraft or satellite sensors. Topics include basic interactions of electromagnetic radiation with the earth, sensors, sensor and ground-data acquisition, data analysis and interpretation, and project design in the form of a proposal to use remote sensing for a specific application.

CSS 6740 Environmental Genomics

Spring. 2 credits. D. Buckley. Genomics opens new avenues for exploring interactions between organisms and their environment. Through lectures and discussion of current research we will learn how genomic tools can provide insight on processes occurring at individual, population, and ecosystem scales that govern the response of biological systems to environmental change. Emphasis will be placed on microbial systems, but this course will also be useful to those interested in the other applications of environmental genomics. The course will provide students with experience in writing and reviewing grant proposals by culminating in the creation of the short research proposals to be reviewed by the class in the style of an NSF panel.

CSS 6750 Modeling the Soil-Plant-Atmosphere System (also EAS 6750)

Spring. 3 credits. Prerequisite: EAS/CSS 4830 or equivalent. S. J. Riha. Introduction to the structure and use of soil-plant-atmosphere models. Topics include modeling plant physiology, morphology, and development; potential crop production and crop production limited by moisture and nutrient availability; plant-plant competition; and land surface processes as well as model data requirements, validation, and scale. Discusses use of soil-plant-atmosphere models for teaching, research, extension, and policy formation.

CSS 6943 Special Topics in Environmental Information Science

Fall or spring. 1–6 credits. Staff. Study of topics in environmental science that are more specialized or different from other courses. Special topics covered depend on staff and student interests.

CSS 7920 Graduate-Level Dissertation Research in Environmental Information Science

Fall or spring. TBA. S–U grades only. Graduate faculty.

Dissertation research for Ph.D. students before “A” exam has been passed.

CSS 8910 Master's-Level Thesis Research in Environmental Information Science

Fall or spring. Credit TBA. S–U grades only. Graduate faculty. Thesis research for master's students.

CSS 9920 Doctoral-Level Dissertation Research in Environmental Information Science

Fall or spring. Credit TBA. S–U grades only. Graduate faculty. Dissertation research for Ph.D. candidates after “A” exam has been passed.

Soil Science

CSS 1120 Microbes, the Earth, and Everything (also BIOMI 1120)

Fall. 3 credits. D. Buckley and E. Angert. We live on a microbial earth. If we happen to consider microbes in our daily lives most people conjure images of disease, but in reality we depend on microbes to sustain our world. This course will showcase the vast microbial world that hides in plain sight all around us and use microbial examples to explore both fundamental biological principles and the scientific method. Course modules will emphasize basic concepts from: evolution, molecular biology and genetics, diversity, and ecology. Learn about the tiny titans and miniature monsters that are the life support system of our planet, how they have shaped human civilizations, and how they reveal the unifying principles of life.

CSS 2600 Soil Science

Fall. 4 credits. J. Russell-Anelli. Designed for students interested in a comprehensive introduction to soil science from both an environmental and plant management perspective. Divided into three units: (1) soil information unit introduces students to soil characterization, testing, mapping, classification, GIS, and land evaluation; (2) soil management unit addresses fertility, pest management, water, and microclimate, as well as erosion, conservation, pollution, and soil health; (3) unit on the role of soils in ecosystems considers topics such as biodiversity, soils as sinks and sources of greenhouse gases, and the impact of soils on land use. Labs are initially field-oriented with an emphasis on learning practical skills needed to evaluate and manage soils. Subsequent labs focus on accessing, interpreting, and applying soil information.

CSS 3210 Soil Management for Sustainability

Spring. 2 credits. Prerequisites: CSS 2600 or equivalent. H. van Es, J. Lehmann, and J. Thies.

Integrated perspectives on the physical, biological, and chemical aspects of soil management in the broader context of agroecosystems. Understanding of the interactions between soil, water, organisms, and chemical inputs forms the basis for discussions on conventional and organic cropping systems, soil health, water quality and quantity, bioenergy, greenhouse gases, and sustainability. Lab sessions elaborate through case studies and discussion of current topics.

[CSS 3620 Soil Morphology

Fall, spring. 1 credit. Prerequisite: undergraduate standing. Recommended for sophomores and juniors. One all-day field trip required. Next offered 2010–2011. J. Russell-Anelli.

Presents the principles for field identification of soil properties, profiles, and landscapes. A series of soil pits are examined, described, classified, and interpreted in the field.]

CSS 3630 Soil Genesis, Classification, and Survey

Fall. 4 credits. Prerequisite: CSS 2600. One all-day field trip required. J. Russell-Anelli. Discusses factors and processes of soil formation on which soil survey is based. Practices principles of field identification, classification, survey, and interpretation in a field setting. Provides an overview of soil databases, their content, development, and use for site evaluation and land classification.

CSS 3650 Environmental Chemistry: Soil, Air, and Water

Spring. 3 credits. Prerequisites: CHEM 2070-2080 or CHEM 1560. M. B. McBride. Overview of the chemistry of the biosphere and biogeochemical processes that control the fluxes, concentrations, and bioavailability of essential elements and pollutants in soil, air, and water. Gives particular attention to soil's function as a filter for contaminants. Describes the history of environmental contamination by xenobiotics and heavy metals, with emphasis on behavior and properties of pollutants that pose the greatest risk to human and ecological health.

CSS 3720 Nutrient Management in Agroecosystems

Spring. 4 credits. Prerequisite: CSS 2600 or permission of instructor. Graduate students should enroll in CSS 4720. J. Lehmann.

Familiarizes students with the basic concepts of soil fertility and biogeochemistry and how soil and environmental properties affect nutrient availability and cycling. Discussion focuses on the way organic farming and soil conservation affect the fate of nutrients in agroecosystems. Emphasizes how nutrient management can be improved without creating environmental hazards. Students have hands-on training in analytical procedures and expand knowledge in discussion groups and through oral as well as poster presentations.

CSS 4660 Soil Ecology (also HORT 4660)

Spring. 4 credits, with lab. Prerequisite: one year of biology or ecology and CSS 2600 or permission of instructor. J. E. Thies.

Discover the wonder of life underground. In this course, you will study the amazing diversity of soil organisms along with their multifaceted functions in terrestrial ecosystems. The fundamental principles and features of biologically mediated processes in the soil and the functions of soil biota in both managed and unmanaged ecosystems will be highlighted. Special topics include beneficial symbioses, biological control of plant pathogens, biogeochemistry of unique habitats, bioremediation and composting of organic wastes, among others. Laboratory focuses on molecular activities and traditional methods for assessing the abundance, activity, and diversity of soil organisms.

CSS 4720 Nutrient Management and Research in Agroecosystems

Spring. 4 credits. Prerequisite: CSS 2600 or permission of instructor. J. Lehmann. Familiarizes students with the basic concepts of soil fertility and biogeochemistry and how soil and environmental properties affect nutrient availability and cycling. Discussion focuses on the way organic farming and soil conservation affect the fate of nutrients in agroecosystems. Emphasizes the way nutrient management can be improved without

creating environmental hazards. Gives students hands-on training in analytical procedures and expands knowledge in discussion groups and through oral as well as poster presentations. The laboratory experiments conclude with a final paper.

[CSS 4830 Land, Water, Agriculture, and Environment (also EAS 4830)]

Fall. 3 credits. Prerequisites: CSS 2600 or equivalent, calculus. Next offered 2010-2011. H. van Es and S. J. Riha. Discussion of energy and mass transfer in the soil-plant-atmosphere system, and their relevance to important environmental processes. Covers water, heat and gas flow, energy budgets, and nutrient dynamics. Discussion of management approaches to sustainable crop production, soil and water conservation, greenhouse gas mitigation, as well as research methods and instrument design for monitoring soil processes. Domestic and international perspectives are covered.]

[CSS 6630 Pedology]

Spring. 3 credits. Prerequisite: CSS 3610 or permission of instructor. Next offered 2010-2011. J. Russell-Anelli. Weathering, reactions, and processes of soil genesis; principles of soil classification and the rationale and use of soil taxonomy; development and significance of major groups of soils of the world.]

CSS 6660 Applied Plant-Microbe Interactions

Fall. 3 credits. Prerequisite: CSS 4660 or equivalent or permission of instructor. Offered alternate years. J. E. Thies. Study and discussion course on the nature of microbial interactions with plant roots aimed at helping students improve their professional practice within the content area.

CSS 6690 Organic Matter—Soils, Sediments, and Waters

Spring. 3 credits. Prerequisites: CSS 2600 and CHEM 3570-3580 or equivalent. J. M. Duxbury. Discussion of current concepts on the chemical nature, dynamics, and properties of natural organics and organo-mineral associations in terrestrial and aquatic environments. Includes a modeling project of soil carbon dynamics in natural or agricultural ecosystems.

CSS 6710 Soil Chemistry

Fall. 3 credits. Prerequisite: one year of physical chemistry or permission of instructor. M. B. McBride. Detailed examination of the structure and surface chemistry of colloidal particles important to the function of soils. Emphasizes ion exchange; mineral-solution equilibria; and adsorption reactions of silicate clays, oxides, and organic matter. Describes the sorption behavior of environmental contaminants in soils, particularly metals and xenobiotics.

[CSS 6720 Nutrient Cycling in Natural and Managed Ecosystems]

Fall. 3 credits. Prerequisite: CSS 3720 or NTRES 3210 or BIOEE 4780, or permission of instructor. Next offered 2010-2011. J. Lehmann. Examines the biogeochemistry and cycles of nutrients in terrestrial ecosystems, and the interface with the biosphere, atmosphere, and hydrosphere, using hands-on field experimentation and research proposals.]

[CSS 6840 Topics in Soil Microbial Ecology]

Fall. 1 credit. Disc. S-U grades. Next offered 2010-2011. D. Buckley. Seminar and discussion course dealing with current topics in soil microbial ecology, including community ecology and diversity, microbial biogeography, biogeochemistry, plant-microbe interactions, microbial feedbacks on plant communities, gene exchange and evolution in soils, soil microbial genomics, and relationships between structure and function of microbial communities in soil systems.]

CSS 6942 Special Topics in Soil Science

Fall, spring, or summer. 1-6 credits. Study of topics in soil science that are more specialized or different from other courses. Special topics covered depend on staff and student interests.

CSS 7900 Graduate-Level Dissertation Research in Soil Science

Fall or spring. Credit TBA. S-U grades only. Graduate faculty. Dissertation research for Ph.D. students before "A" exam has been passed.

CSS 8920 Master's-Level Thesis Research in Soil Science

Fall or spring. Credit TBA. S-U grades only. Graduate faculty. Thesis research for master's students.

CSS 9900 Doctoral-Level Dissertation Research in Soil Science

Fall or spring. Credit TBA. S-U grades only. Graduate faculty. Dissertation research for Ph.D. candidates after "A" exam has been passed.

DEVELOPMENT SOCIOLOGY

M. J. Pfeffer, chair (133A Warren Hall, 255-1676); A. Basu, D. L. Brown, P. Eloundou-Enyegue, S. Feldman, J. D. Francis, C. C. Geisler, A. Gonzales, D. T. Gurak, T. A. Hirschl, F. Makki, P. D. McMichael, R. L. Mize, L. B. Williams

DSOC 1101 Introduction to Sociology (SBA) (KCM)

Fall or spring. 3 credits. Students may not take both DSOC 1101 and SOC 1101 for credit. Fall, T. Hirschl; spring, A. Gonzales.

Introduction to theory and research in sociology. Demonstrates how the insights, theories, and methods of sociological analysis can be brought to bear on major issues of social life. A primary goal is to convey a sense of the manner in which sociologists formulate theories and how the collection and analysis of data are used to evaluate those theories. Provides "hands-on" experience in analyzing sociological issues. Students undertake guided research exercises that involve using computers to analyze actual data. No prior background is

presumed; necessary skills are covered in class and section meetings.

DSOC 1200 Development Sociology First-Year Writing Seminar (SBA)

Fall, spring. 3 credits. Staff.

The department offers first-year writing seminars on a wide range of development sociology topics. Consult John S. Knight Writing Seminar Program brochures for instructors and descriptions.

DSOC 2010 Population Dynamics (also SOC 2202) (SBA)

Spring. 3 credits. ALS students must enroll in DSOC 2010. S–U or letter grades.

A. Basu and D. Brown.

This course provides an introduction to population studies. The primary focus is on the relationships between demographic processes (fertility, mortality, and immigration) and social and economic issues. Discussion will cover special topics related to population growth and spatial distribution, including marriage and family formation, population aging, changing roles and statuses of women, labor force participation, immigrations, urban growth and urbanization, resource allocation, and the environment.

DSOC 2050 International Development (also SOC 2206) (SBA) (HA)

Spring. 3 credits. P. McMichael.

Examines new questions concerning development models in the post–Cold War era from a comparative and global perspective on North–South relations. While the focus is the “Third World,” the issues confronting it are often global, even when they concern the most basic issue of food security. Using films and various theoretical perspectives, the course examines Southern societies (economies, ecologies, class/gender relations) and the impact of global forces on Southern resources. Such forces include global food systems, new forms of export production, development agencies, multilateral institutions, local bureaucracies, transnational corporations, the debt crisis, and new technologies. Also examines the new global justice movements, such as environmentalism, feminism, and landless workers, peasant, and grassroots activism.

DSOC 2070 Problems of Contemporary Society (also SOC 2070) (SBA)

For description, see SOC 2070.

DSOC 2090 Social Inequality (also SOC 2208) (SBA)

For description, see SOC 2208.

DSOC 2150 Introductory Organizations (also SOC 2150) (SBA)

For description, see SOC 2150.

DSOC 2200 Sociology of Health of Ethnic Minorities (also LSP 2200) (SBA) (D)

Fall. 3 credits. S–U or letter grades.

P. A. Parra.

Discusses the health status of minorities in the United States. Explores intragroup diversity such as migration, economic status, and the influence of culture and the environment on health status and access to health care. Although special attention is given to Latino populations, discussion encompasses other minorities who face similar problems.

DSOC 2201 Society and Natural Resources (also NTRES 2201) (SBA)

For description, see NTRES 2201.

DSOC 2220 Controversies About Inequality

For description, see SOC 2220.

DSOC 2650 Latinos in the United States (also SOC 2650, LSP 2010) (SBA)

For description, see SOC 2650.

DSOC 2750 Immigration and a Changing America (SBA) (HA)

Spring. 3 credits. S–U or letter grades.
D. Gurak.

Immigration helped America become the nation that it is today. While many experts thought that immigration’s contribution to American history ended in the early 1900s, immigration surged to historic highs in the second half of the 20th century and shows no signs of diminishing in the 21st century. This course examines the economic, social, and policy forces that underlie contemporary U.S. immigration and the impacts that immigrants are having on the American economy and society today. It looks in detail at who the new immigrants are, why they come to America, where they live, and what roles they fill in America.

DSOC 3010 Theories of Society and Development (SBA) (KCM)

Spring. 3 credits. Prerequisite: development sociology or sociology course. S–U or letter grades. F. Makki.

Introduction to the “classical” sociological theorists (Marx, Weber, Durkheim) of the late 19th and early 20th century. Also addresses the dramatic social upheavals of the industrialization, capitalism, and rise of bureaucracy to which these thinkers reacted and the inspiring (and conflicting) visions for the future which they offered. Emphasizes the intellectual history, the influence of the theorists on subsequent sociology, and the potential for relevance to contemporary society.

DSOC 3050 Education, Inequality, and Development (SBA)

Spring. 3 credits. Prerequisite: introductory social science course or permission of instructor. Letter grades. P. Eloundou-Enyegue.

The main goal of this course is to examine the functions of education institutions, as they affect individual welfare, inequality, and development. It begins with a review of basic definitions and measures of education, inequality, and development, it then examines the individual and societal functions of education, from theoretical perspectives drawn from sociology, economics, and demography. The insights from these various perspectives are examined critically. The course also reviews studies that have examined how investments in education appear to affect selected outcomes.

DSOC 3060 Farmworkers: Contemporary Issues and Their Implications (SBA)

Fall. 1 credit. S–U or letter grades.

M. J. Dudley.

Introduction to contemporary issues of farmworkers in the United States. Examines issues related to unauthorized immigrant workers, farmworker demographics, farmworker access to health services, labor concerns, farmworker needs, and integration into new home communities. Will include guest lectures by faculty members from throughout the university currently engaged in related research.

DSOC 3130 Social Indicators and Introduction to Social Science Research (SBA)

Spring. 3 credits. P. Eloundou-Enyegue.

This course is an introduction to social science research. It reviews the general process through which social scientists derive credible answers to important questions about social change and social influences on individual behavior. It covers all steps in the research process, from the formulation of a research question to the final presentation of findings. The course is designed as a preparation for future work in social science research, but it is also intended for students who simply want to sharpen their capacity to evaluate the claims made by researchers. The course combines theory and application. A real-life research project on campus is used to apply the concepts and ideas from the textbook and lectures.

DSOC 3140 Spatial Thinking, GIS, and Related Methods (SBA) (KCM)

Fall. 4 credits. Letter grades only.

J. Francis.

Everything occurs in space. Knowing where organizations are located and events occur in space provides clues to understanding social order and processes not revealed by traditional social analysis techniques. At the same time, spatial thinking and methods are becoming increasingly used in the social sciences. The purpose of this course is to introduce the undergraduate to both aspects of spatial patterns, trends, and themes but also to methodologies for bringing spatial considerations into their research. The course will provide a practical introduction to GIS via lab assignments.

DSOC 3240 Environment and Society (also STS 3241, SOC 3240) (SBA)

Spring. 3 credits. G. Gillespie.

The main objective is to develop a critical understanding of the dominant trends in modern U.S. environmental thought, such as preservationism, conservationism, deep ecology, social ecology, NIMBYism, risk assessment, ecological modernization, and environmental equity. A second objective is to familiarize students with some major contemporary substantive environmental problems and policies. These topics include air and water quality, public lands management, biodiversity, deforestation, climate change, and ozone depletion. A sociological framework is applied to evaluate interrelationships of substantive and philosophical/theoretical issues.

DSOC 3290 Latin American Politics, Economy, and Society (also GOVT 3992, LATA 3290)

Spring. 3 credits. Prerequisite: introductory sociology recommended. S–U or letter grades. G. Flores-Macias.

This course is designed as an introduction to political, economic, and social issues in 20th-century Latin America. In the first section of the course the region is analyzed through a political lens, focusing on issues including state formation, populism and corporatism, revolutions, the breakdown of democracy, military rule, and democratization. We then turn to issues under the heading of economic perspectives including dependency theory, import-substitution industrialization, the debt crisis, market reform, and the period of the post-Washington Consensus. The third section of the course presents a selection of the region’s

central social issues including class structures, civil-military relations, church-state relations, social movements, and both internal and international migration. Throughout the semester, we will make reference to specific countries to illustrate each topic. Knowledge of Spanish or Portuguese is not required.

[DSOC 3311 Environmental Governance]

DSOC 3360 Rural Areas in Metropolitan Society (SBA)

Spring. 3 credits. Prerequisite: social science course. D. Brown.

Analyzes the changing structure and role of small towns and rural areas in developed nations. Focuses on adaptation of rural communities and populations to major trends, including increased societal differentiation and complexity; increased societal interdependence; and rapid social, economic, technological, and ecological change. Considers alternative policies to ameliorate rural problems and/or enhance rural contributions to national development. Students participate in group research projects in rural communities.

DSOC 3400 Agriculture, Food, and Society (SBA) (KCM)

Fall. 3 credits. S-U or letter grades. G. W. Gillespie.

Changing food and agricultural systems reflect the development patterns and social organization of an increasingly global society. Sociological questions include: What are major trends? What drives them? What benefits and costs accrue to people, communities, and ecosystems? How can we evaluate issues in such a way as to promote problem-solving? What development strategies might better manifest shared values?

DSOC 3550 Latinos, Law, and Identity (also LSP/AMST 3550) (SBA)

Fall. 3 credits. Prerequisite: DSOC 1101 or permission of instructor. R. Mize.

Critical exploration of the critical justice movement and Latina/o identities. Legal cases, federal and state laws, and constitutional issues that impact Latina/os residing in U.S. highlighted. Theoretical contributions of law and society, critical race theory, LatCrit, and outsider jurisprudence perspectives applied to precedent-setting cases and current attempts at marginalizing/empowering Latina/o communities.

DSOC 3700 Comparative Social Inequalities (also SOC 3710) (SBA)

Fall and spring. 3 credits. Prerequisite: introductory social science course. Fall, R. Mize; spring, T. Hirschl.

Reviews both classical and contemporary issues in the comparative study of social inequality. Employing a global perspective, the course examines various relations of inequality—in the labor market and the reorganization of work and employment and in relation to questions of difference—of race, gender, ethnicity, sexuality, and ability—as these pattern unequal access to resources, differentially provide economic and social security, and shape life chances and lived experiences. Throughout the course special attention is given to the importance of understanding patterns of change in relation to the reconfiguration of global production, consumption, and migration.

DSOC 3750 Comparative U.S. Racial and Ethnic Relations (also AMST/ LSP 3750) (SBA) (HA)

Spring. 3 credits. Prerequisite: DSOC 1101 or permission of instructor. Letter grades only. R. L. Mize.

A comparative historical study of the social construction of race. Examines structures of racism as they influence Latina/o, African American, Native American, and Asian American experiences. Does a critical interrogation of whiteness and ethnic identities. Focuses on historical legacy of institutional and interpersonal racism and its contemporary relevance in terms of political economic, residential, legal, educational, cultural, health, and social-psychological inequalities.

DSOC 4100 Health and Survival Inequalities (also SOC 4100) (SBA)

Fall. 4 credits. Letter grades only. A. Basu.

Historical inequalities in health and survival continue to exist today. This course will cover some of the markers of such inequalities, including region, class, race, gender, and age and examine some of the biological, socioeconomic, and political determinants of these differences. Macro as well as individual and family level determinants will be examined. Policy prescriptions will be evaluated and new innovative approaches proposed.

DSOC 4210 Theories of Reproduction (also SOC 4210) (SBA)

Spring. 4 credits. Letter grades only. A. Basu.

Examines the contentious debate of what makes women have any, few, and many children. It covers theories of population growth and changing fertility in both historical and contemporary populations. Demographic concepts like “the demographic transition” and “natural fertility” are discussed. Primary attention is given to “sociocultural” and “gender-based” explanations of reproductive behavior. The course also looks at theories about the place of the state in women’s lives.

DSOC 4300 Human Migration: Internal and International (SBA)

Fall. 3 credits. S-U or letter grades. D. Brown.

This course analyzes the determinants and consequences of internal and international migration in developed and developing nations. Multilevel and multidisciplinary approaches are emphasized. Public policy implications of the volume and composition of migration for origin and destination communities are examined. Techniques and measurement issues are discussed.

[DSOC 4320 Environmental Strategies]

DSOC 4380 Population and Development (also DSOC 6380, SOC 4370) (SBA)

Spring. 3 credits. D. Gurak.

Examines major historical and recent demographic transitions in mortality, fertility, age structure, and composition and explores the relationships between these transitions and the social, or economic, and cultural changes being experienced by diverse societies prior to, during, and following the onset and conclusions of the demographic shifts. Case studies from diverse historical periods and geographic locations are used. Graduate students also meet with the instructor every

other week to discuss graduate readings and topics relevant to their papers.

DSOC 4630 Islam in Africa and Its Diaspora

For description, see ASRC 4630.

DSOC 4810 Global Conflict and Terrorism (SBA) (KCM)

Spring. 3 credits. C. Geisler.

Reviews and discusses issues concerning global development and its relationship to conflict and terrorism. Each class session focuses on a specific topic presented by either a faculty member or a guest speaker leading the discussion and actively engaging the students. The weekly discussion section focuses on discussing in greater depth the reading assignments.

DSOC 4940 Special Topics in Development Sociology (SBA)

Fall or spring. 4 credits max. S-U or letter grades.

The department teaches “trial” courses under this number. Offerings vary by semester, and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

DSOC 4960 Internship in Development Sociology

Fall and spring. 1-3 credits. Prerequisite: permission of student’s advisor in advance of participation in internship program. Staff.

Students must register using individual study form (available in 140 Roberts Hall) signed by faculty member who will supervise study and assign grade. All 4960 internship courses must adhere to the CALS guidelines on the web site at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

DSOC 4970 Independent Study in Development Sociology (SBA)

Fall or spring. 3 credits, variable; may be repeated for credit. Students must register using independent study form (available in 140 Roberts Hall). S-U or letter grades.

Informal study may include a reading course, research experience, or public service experience.

DSOC 4991 Independent Honors Research in Social Science (SBA) (KCM)

Fall and spring. 1-6 credits; 6 credits max. may be earned in honors program.

Prerequisite: requirements for honors program met. A. Gonzales.

Students should select a faculty advisor and begin proposal development during the junior year. Students must submit written proposals by the third week of the semester of their senior year to the departmental honors committee representative.

DSOC 5600 Analytical Mapping and Spatial Modeling (also CRP 6290) (SBA) (KCM)

Fall. 4 credits. Prerequisite: one course in statistics. J. Francis.

The goal of this course is to introduce students in the social sciences and related fields to geographic information systems and spatial statistics as a set of tools to complement traditional analysis methods. Spatial relationships have become increasingly recognized as important in

socioeconomic, political, and demographic analysis. Recent research in these fields has demonstrated that understanding spatial relationships, in addition to other factors that account for differences and similarities between people and organizations, significantly increase our explanatory power. The first part of the course focuses on various features of GIS that are most useful to social scientists in their endeavors. The second part of the course introduces spatial statistics that further this understanding as well as control for spatial autocorrelation when it exists.

DSOC 6001 The Empirics of Development and Social Change (SBA)

Spring. 3 credits. Prerequisite: graduate standing. P. Eloundou-Enyegue. The purpose of this course is to review, critique, and apply several analytical approaches for measuring and explaining societal change. As such, it serves as a complement to theories of development. More broadly, the course critically examines the empirical record on global development, drawing from several methodological approaches, both quantitative and qualitative.

DSOC 6030 Classical Sociological Theory

Fall. 4 credits. Prerequisite: graduate students only. M. J. Pfeffer. Reviews the main streams of classical sociological thought, focusing on the work of Weber, Durkheim, Marx, and Simmel. Course materials include original texts and secondary literature used to examine the concepts, methods, and explanation in classical sociological thought. Important objectives are to identify the philosophical and conceptual core of the discipline and to critically evaluate the relevance of the classical theories to contemporary social change and development.

DSOC 6060 Sociological Theories of Development

Spring. 3 credits. Prerequisite: DSOC 6030 or permission of instructor. F. Makki. Critical examination of a historical range of theories and research in the sociology of development from the postwar period through the present. Major topics include modernization theory, dependency theory, world-system theory, the developmental state, global commodity chains, and globalization. Throughout the course, the concept of development itself is questioned and critiqued both theoretically and in terms of practical challenges from environmental, indigenous, and other social movements.

DSOC 6080 Demographic Techniques (also PAM 6060)

Spring. 3 credits. Prerequisite: multivariate statistics or permission of instructor. S-U or letter grades. D. Lichter. Introduction to the methods, measures, and data used in the analysis of human populations. Topics include demographic rates, life-table analysis, cohort vs. period analysis, sources and quality of demographic data, population estimation and projection, and stable population models.

[DSOC 6150 Qualitative Research Methods]

DSOC 6170 Foundations in Social Research: Comparative Epistemologies

Fall. 3 credits. Letter grades only. G. Menon.

Seminar designed to introduce graduate students in the social sciences to the variety of epistemological approaches used by social scientists to analyze social change and development. Examines both positivist and nonpositivist approaches. Relates the relationship of quantitative and qualitative methodologies to different epistemologies.

DSOC 6190 Quantitative Research Methods

Spring. 4 credits. Prerequisite: statistics course. Letter grades only. D. Gurak.

Graduate-level course in measurement and analysis of survey, demographic, and observational data. Topics include linear regression, analysis of variance, and analysis of covariance with both continuous and categorically coded variables. Introduces logistic regression and some nonlinear models. Gives special attention to handling ordered and unordered categorical data as these are prevalent in social/demographic data sets. Analyzes data from real surveys like the American National Election Studies and the General Social Surveys using programs like SAS and SPSS. Includes labs and writing programs to analyze these data. Students familiarize themselves with data cleaning, missing data estimation, transformations, subsetting, and other data handling procedures.

[DSOC 6200 Sociology of the Community (SBA)]

DSOC 6210 Foundations of Environmental Sociology (SBA)

Fall. 3 credits. Graduate students only. C. Geisler.

Foundations of environmental sociology provide graduate students with a broad survey of the literature in this disciplinary specialty area. Students review the history of thought in environmental sociology as well as key literature in the various substantive foci of this specialty. The principle objective of this course is to provide graduate students specializing in environmental sociology with a firm grasp of the content, controversies, and trends in the area. Sessions are conducted in a seminar style, and discussions are focused on close review of assigned readings.

[DSOC 6250 State, Economy, and Society (SBA) (HA)]

DSOC 6300 Human Migration: Internal and International (also DSOC 4300)

For description, see DSOC 4300.

[DSOC 6320 Environmental Governance]

DSOC 6380 Population and Development (also DSOC 4380)

[DSOC 6400 Community and Changing Property Institutions (SBA)]

DSOC 6630 Islam in Africa and Its Diaspora

For description, see ASRC 4630.

DSOC 6940 Special Topics in Development Sociology

Fall or spring. 4 credits max. Prerequisite: graduate standing. S-U or letter grades. The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the

semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

[DSOC 7001 The Historical Sociology of Modernity (KCM) (HA)]

Fall. 3 credits. Graduate students only. F. Makki.

The notion of modernity as a postulated relationship between social change and institutional form, and as a conceptual schema for making sense of large-scale social transformations, supplies the deep structure for much present-day social theory. Conceived as a uniquely European phenomenon that spread to the rest of the world through the impact of colonial empires and the world market, it also provides the normative framework for contemporary theories of development. This conception of modernity, and the meta-theory that legitimates it, has increasingly been the subject of heated controversy. In this course, we will explore the distinct debates that animate this field of historical sociology, alternating between substantive historical studies and critical analysis of how these studies are shaped by the adoption of particular epistemologies.]

DSOC 7190 Advanced Regression and Spatial Statistics (SBA) (KCM)

Spring. 4 credits. Prerequisite: graduate students or permission of instructor and two courses in statistics and one in methods. J. Francis.

This course will cover two topics, logistic regression and spatial linear regression. The course opens with a brief review of multiple regression theory and procedures. Then a little more than half the semester is devoted to logistic regression modeling. Spatial linear regression will be covered in five weeks of the semester. As both of these techniques are based on maximum likelihood procedures, some time will be devoted to an overview of maximum likelihood procedures.

DSOC 7250 Theories of State, States of Theory (SBA)

Fall. Graduate students only. S. Feldman. This course examines how processes of political, economic, and social restructuring reshape state capacities and processes of state formation. The animating question: How have new patterns of "globalization"—transnational corporatist alliances, social movements, and new hegemonic relations—altered how we understand the meanings, activities, and power of rule? Critical to these discussions are the contours of nationalisms and fundamentalisms as these emerge and reconfigure national, regional, and global alliances and practices, as well as shape interpretations of current processes of resistance, change, and terms of intervention and exchange. The course engages historical, poststructural, postcolonial, and comparative theories particularly as these have emerged and been refined by current debates in South Asia, Latin America, and Africa.

DSOC 7300 Sociology of Global Change (SBA)

Spring. 3 credits. Graduate students only. P. McMichael.

Analyses of social change and development are increasingly sensitive to global context. They include the sociology of the world economy as a multilayered entity anchored in

an evolving international division of labor and the system of nation states, and the sociology of transnational political, economic, and cultural processes (e.g., food regimes, commodity chains, diasporas and transnational identities, the new regionalism, and transnational social movements). The seminar examines the substantive and methodological questions generated by research on these global processes, including questions of relevant units of analysis, situating global process in local events and subjectivities and vice versa, and examining the ways in which national structures and cultures interact with global structures and cultures.

DSOC 7600 Environment and Social Transitions: Graduate Seminar in Environmental Sociology (also NTRES 7600)

Spring or fall. 3 credits. Graduate Students Only. Graduate faculty.

Graduate seminar on advanced sociology-of-environment themes. We seek to focus analysis on contemporary socioecological transitions and their implications, theoretical and applied. Attention will be directed toward ecological, social, political, and technological dimensions of policy regimes, conventions, and governance. The seminar aims to understand and advance social science responses to prevailing paradigms in domains of conservation, energy, climate, agriculture, and natural resource conservation; the emphasis will rotate according to year and instructor.

DSOC 7900 Graduate-Level Thesis Research

Fall or spring. Credit TBA. Prerequisite: DSOC graduate standing and permission of instructor. S-U or letter grades. Graduate faculty.

Thesis research for Ph.D. students **only before** "A" exam has been passed.

DSOC 7910 Teaching Experience

Fall or spring. 1-3 credits. Prerequisite: DSOC graduate standing. S-U grades only. Graduate faculty.

Participation in the ongoing teaching program of the department.

DSOC 8720 Development Sociology

Prerequisite: master's and doctoral degree candidates, permission of graduate field member concerned. S-U or letter grades. Graduate faculty.

DSOC 8900 Master's-Level Thesis Research

Fall or spring. Credit TBA. Prerequisite: DSOC graduate standing and permission of instructor. S-U or letter grades. Graduate faculty.

Thesis research for master's students.

DSOC 9900 Doctoral-Level Thesis Research

Fall or spring. Credit TBA. Prerequisite: DSOC graduate standing and permission of instructor. S-U or letter grades. Graduate faculty.

Thesis research for Ph.D. candidates **after** "A" exam has been passed.

Related Courses in Other Departments

(Others may be added)

Population Dynamics (SOC 2050)

Gender Relations, Gender Ideologies, and Social Change (FGSS 5240)

EARTH AND ATMOSPHERIC SCIENCES

L. D. Brown, chair (2116 Snee Hall, 255-6346); A. T. DeGaetano, assoc. chair; director of undergraduate studies: J. L. Cisne (Science of Earth Systems); M. W. Wysocki (Atmospheric Science), R. W. Allmendinger, W. D. Allmon, C. Andronicos, L. M. Cathles, S. J. Colucci, L. A. Derry, M. Goman, C. H. Greene, D. L. Hysell, T. E. Jordan, R. W. Kay, S. Mahlburg Kay, R. Lohman, N. Mahowald, B. Monger, A. Moore, J. Phipps Morgan, M. Pritchard, S. J. Riha, W. M. White, D. S. Wilks

General Courses

EAS 1150 Severe Weather Phenomena

Summer. 3 credits. S-U or letter grades. M. W. Wysocki.

A description of the structure of the Earth's atmosphere and forces that govern its motion will be presented and then applied to understanding the aspects of severe weather including snowstorms/lake effect snow, windstorms, tornadoes, thunderstorms, tropical cyclones, El Niño, floods, drought, and heat waves.

EAS 1400 Freshman Writing Seminar "Writing in the Sciences: Environmental Perspectives"

Spring. 3 credits. S. Jessup.

This course is a Freshman Writing Seminar in which students examine interactions between humans and the natural environment from individual, societal, and scientific perspectives. Readings include a brief historical survey of humanity's role within the natural world and short readings about current environmental issues. Includes a research project where each student explores a current environmental issue.

EAS 2900 Computer Programming and Meteorology Software

Spring. 3 credits. Prerequisites: EAS 1310; MATH 1110 or equivalent. N. Mahowald and B. Belcher.

Introduction to Fortran computer programming and visual software packages specifically tailored for meteorological application usage. Topics include basic FORTRAN 90 programming (this includes problem analysis, algorithm development, and program writing and execution), data manipulation, and instruction in the use of GrADS, and GEMPACK visual display tools.

EAS 4960 Internship Experience

Fall or spring. 1-2 credits. S-U grades only. Staff. See individual units for requirements.

All 4960 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

EAS 4980 Teaching Experience in Earth and Atmospheric Sciences

Fall, spring. 1-4 credits. S-U grades only. Students must register using independent study form. Staff.

The student assists in teaching an EAS course appropriate to his or her previous training. The student meets with a discussion or laboratory section, prepares course materials, grades assignments, and regularly discusses course objectives and teaching techniques with the faculty member in charge of the course.

Atmospheric Science

EAS 1310 Basic Principles of Meteorology

Fall. 3 credits. M. W. Wysocki.

Simplified treatment of the structure of the atmosphere: heat balance of the Earth; general and secondary circulations; air masses, fronts, and cyclones; and hurricanes, thunderstorms, tornadoes, and atmospheric condensation. The optional 1-credit laboratory for the course is offered as EAS 1330.

EAS 1330 Basic Meteorology Lab

Fall. 1 credit. Corequisite: EAS 1310. M. W. Wysocki.

This course is required for atmospheric science majors but is optional for other students taking EAS 1310.

EAS 1340 Weather Analysis and Forecasting

Spring. 1 credit. Prerequisites: EAS 1310 and EAS 1330. S-U grades only. M. W. Wysocki and staff.

This course will serve as an extension of the EAS 1330 first-year majors lab. It will provide opportunity for formal weather briefings, explore specific atmospheric storms (synoptic and mesoscale, including the climatology of each storm type), through assigned readings, map analysis, and weather discussions.

EAS 2500 Meteorological Observations and Instruments

Fall. 4 credits. Prerequisite: EAS 1310. M. W. Wysocki.

Covers methods and principles of meteorological measurements and observations including surface, free-air, and remote systems. Also covers instrument siting, mounting, and protection; instrument response characteristics, calibration, and standardization; and recorders and data logging systems. Laboratory exercises are in observation and data analysis.

EAS 2680 Climate and Global Warming

Spring. 3 credits. Prerequisite: basic college math. S-U or letter grades. A. T. DeGaetano.

Familiarizes students from a range of disciplines with such contemporary issues in climatology as global warming and El Niño. Introduces the natural greenhouse effect, past climates, and observed and projected climate changes and impacts. Also covers natural climate variations (e.g., El Niño) and their consequences and predictability. Readings focus on recent scientific findings related to climate change.

EAS 2960 Forecast Competition

Fall and spring. 1 credit; students enroll for two consecutive semesters; credit awarded after second semester; may be repeated for credit. Prerequisite: undergraduate standing in atmospheric science or permission of instructor. S–U grades only. D. S. Wilks.

Two-semester course providing daily exercise in probabilistic weather forecasting, in which students compete to forecast local weather most skillfully.

EAS 3050 Climate Dynamics

Fall. 3 credits. Prerequisites: two semesters of calculus and one semester of physics. N. Mahowald.

Discusses processes that determine climate and contribute to its change, including atmospheric radiation, ocean circulation, and atmospheric dynamics. Investigates contemporary climate change issues and discusses them in the context of natural variability of the system.

EAS 3340 Microclimatology

Spring. 3 credits. Prerequisite: physics course. D. S. Wilks.

The relationship of radiant energy, temperature, wind, and moisture in the atmosphere near the ground. The interplay between physical processes of the atmosphere, plant canopies, and soil is examined with emphasis on the energy balance.

EAS 3410 Atmospheric Thermodynamics and Hydrostatics

Fall. 3 credits. Prerequisites: one year of calculus and one semester of physics. M. W. Wysocki.

Introduction to the thermodynamics and hydrostatics of the atmosphere and to the methods of description and quantitative analysis used in meteorology. Topics include thermodynamic processes of dry air, water vapor, and moist air, and concepts of hydrostatics and stability.

EAS 3420 Atmospheric Dynamics (also ASTRO 3342)

Spring. 3 credits. Prerequisites: familiarity with multivariate calculus (e.g., MATH 2930, 2130, or 2220 or equivalent); one semester of university physics. Staff.

Introduction to the basic equations and techniques used to understand motion in the atmosphere, with an emphasis on the space and time scales typical of storm systems (the synoptic scale). Derives the governing equations of atmospheric flow from first principles and applies them to middle latitude and tropical meteorology. Topics include balanced flow, atmospheric waves, circulation, and vorticity.

EAS 3520 Synoptic Meteorology I

Spring. 3 credits. Prerequisite: EAS 3410. Corequisite: EAS 3420. M. W. Wysocki.

Study of weather map analysis and forecasting techniques by applying the principles of fluid and heat flow. Strengthens previously introduced meteorological concepts that are applied to forecasting midlatitude synoptic scale weather systems, such as cyclones, anticyclones, jet streams, fronts, and waves.

EAS 4350 Statistical Methods in Meteorology and Climatology

Fall. 3 credits. Prerequisites: one introductory course each in statistics (e.g., AEM 2100) and calculus. D. S. Wilks.

Statistical methods used in climatology, operational weather forecasting, and selected meteorological research applications. Includes statistical characteristics of meteorological data including probability distributions and correlation structures. Covers operational forecasts derived from multiple regression models, including the MOS system and forecast evaluation techniques.

EAS 4470 Physical Meteorology

Fall. 3 credits. Prerequisites: one year each of calculus and physics. Offered alternate years. A. T. DeGaetano.

Primarily a survey of natural phenomena of the atmosphere, with emphasis on their underlying physical principles. Topics include an introduction to atmospheric radiation processes; atmospheric optics and electricity; microphysical cloud processes; and principles of radar probing of the atmosphere.

EAS 4510 Synoptic Meteorology II

Fall. 3 credits. Prerequisites: EAS 3410 and 3420. S. J. Colucci.

Structure and dynamics of large-scale midlatitude weather systems, such as cyclones, anticyclones, and waves, with consideration of processes that contribute to temperature changes and precipitation. Lab sessions involve real-time weather forecasting and the computer application of a numerical model of the atmosphere to study selected large-scale midlatitude weather events.

EAS 4560 Mesoscale Meteorology

Spring. 3 credits. Prerequisites: EAS 3410 and 3420 or permission of instructor. S. J. Colucci.

Structure and dynamics of midlatitude mesoscale weather systems such as fronts, jets, squall lines, convective complexes, precipitation bands, downslope windstorms, mountain breezes, sea breeze circulations, and lake effect snowstorms. The course also considers tropical weather systems and mesoscale modeling.

[EAS 4570 Atmospheric Air Pollution

Fall. 3 credits. Prerequisites: EAS 3410 or one course in thermodynamics, and one semester of chemistry, or permission of instructor. Offered alternate years; next offered 2010–2011. M. W. Wysocki.]

EAS 4700 Weather Forecasting and Analysis

Spring. 3 credits. Prerequisites: EAS 3520 and 4510. M. W. Wysocki.

Applied course focusing on weather forecasting and analysis techniques for various regions around the world. Lectures emphasize the application of student's knowledge of atmospheric dynamics, thermodynamics, and computer data analysis, to forecast the development and movement of multiscale weather systems. Students participate in weekly forecast discussions; write daily forecasts that include a synoptic discussion, quantitative precipitation forecasts, and severe weather outlook for the forecast region; and lead class discussion on assigned readings.

EAS 4800 Our Changing Atmosphere: Global Change and Atmospheric Chemistry (also BEE 4800)

Fall. 3 credits. Prerequisites: CHEM 2090, MATH 1920, PHYS 1112 or equivalent, or permission of instructor. S–U or letter grades. P. G. Hess.

For description, see BEE 4800.

EAS 4820 Atmospheric Modeling

Spring. 3 credits Prerequisite: differential equations, introductory computer background, junior standing or above or permission of instructor. N. Mahowald. Climate and numerical weather prediction models are important tools for policy and science. This course describes the basic principle of the numerics in these models, including dynamical cores and subgrid-parameterization. Included will be a discussion of evaluation of models and effective presentation of model results.

[EAS 4830 Land, Water, Agriculture, and Environment (also CSS 4830)

Fall. 3 credits. Next offered 2010–2011. H. van Es and S. J. Riha.

For description, see CSS 4830.]

EAS 4840 Inverse Methods in the Natural Sciences

Fall. 3 credits. Prerequisites: MATH 2940. D. L. Hysell.

An exploration of solution methods for inverse problems with examples taken from geophysics and related fields, with particular attention to making inferences from inaccurate, incomplete, or inconsistent physical data. Applications include medical and seismic tomography, earthquake location, image processing, and radio/radar imaging. Linear algebra (including condition numbers) and probability and statistics (including error analysis, Bayes theorem, Gibbs distribution, and Markov chains) will be reviewed. Methods to be covered include nonlinear least-squares, maximum likelihood methods, and local and global optimization methods, including simulated annealing and genetic algorithms.

EAS 4870 Introduction to Radar Remote Sensing (also ECE 4870)

Spring. 3 credits. Prerequisite: PHYS 2208 or 2213 or equivalent, or permission of instructor. D. L. Hysell.

Fundamentals of radar, antennas, and remote sensing. Exposes students to the principles underlying the analysis and design of antennas used for communication and for radar-related applications. Students also encounter both a mathematical and a practical description of how radars function, how their performance can be optimized for different applications, and how signals acquired by them can be processed. The objective is to familiarize students with a wide variety of radars rather than to turn them into practicing radar engineers. Each topic is developed from basic principles so students with a wide variety of backgrounds are able to take the course. Emphasizes radar applications in geophysics, meteorology and atmospheric sciences, and astronomy and space sciences. Gives special attention to radar remote sensing of the Earth from spacecraft.

EAS 4940 Special Topics in Atmospheric Science (undergraduate level)

Fall or spring. 8 credits max. S–U or letter grades. Staff.

The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. The same course is not offered more than twice.

EAS 4970 Individual Study in Atmospheric Science

Fall or spring. 1–6 credits. S–U grades only. Students must register using independent study form. Staff.

Topics are arranged at the beginning of the semester for individual study or for group discussions.

EAS 4990 Undergraduate Research in Atmospheric Science

Fall or spring. Credit TBA. S–U grades only. Students must register using independent study form. Staff.

Independent research on current problems in atmospheric science.

EAS 5050 Fluid Dynamics in the Earth Sciences

Spring. 3 credits. Prerequisites: MATH through 2940, PHYS through 2208 or 2214, or permission of instructor.

L. Cathles and M. Wysocki.

The Earth System provides many fascinating examples of fluid dynamics phenomena that are also of societal importance. Turbulent convection in the outer core generates the earth's magnetic field. The viscous mantle (outer half of the Earth) is slowly but vigorously convecting, and consequently the Earth's surface is dynamic. Viscosity is not important in the oceans and atmosphere, but the flow there is fast enough for the rotation of the Earth to become dominant control. Electromagnetic effects again dominate in the solar wind and magnetosphere. This course will investigate the Earth using fluid dynamics. For students in the Earth sciences it will provide an opportunity to learn the insights that can be provided by fluid dynamics. For students who know fluid dynamics from other fields it will provide some spectacular applications and an opportunity to learn about the Earth system in a different and unusually fundamental way.

[EAS 5750 Planetary Atmospheres (also ASTRO 6575)]

Fall. 4 credits. Next offered 2010–2011. P. Gierasch.

For description, see ASTRO 6575.]

EAS 5840 Inverse Methods in the Natural Sciences

Fall. 3 credits. Prerequisite: MATH 2940. D. L. Hysell.

An exploration of solution methods for inverse problems with examples taken from geophysics and related fields, with particular attention to making inferences from inaccurate, incomplete, or inconsistent physical data. Applications include medical and seismic tomography, earthquake location, image processing, and radio/radar imaging. Linear algebra (including condition numbers) and probability and statistics (including error analysis, Bayes theorem, Gibbs distribution, and Markov chains) will be reviewed. Methods to be covered include nonlinear least-squares, maximum likelihood methods, and local and global optimization methods, including simulated annealing and genetic algorithms. Students in EAS 5840 will be expected to complete and present a substantial class project to be negotiated with the instructor.

EAS 6480 Air Quality and Atmospheric Chemistry (also MAE 6480)

Fall. 3 credits. Prerequisites: freshman chemistry, fluid mechanics or equivalent, thermodynamics. S–U or letter grades. K. M. Zhang.

Factors determining air quality and effects of air pollutants on public health, ecological systems and global climate change.

[EAS 6520 Advanced Atmospheric Dynamics (also ASTRO 7652)]

Spring. 3 credits. Prerequisites: EAS 3410 and 3420 or equivalents. Next offered 2010–2011. S. J. Colucci.

Covers quasigeostrophic theory, atmospheric waves, hydrodynamics instability, general circulation of the atmosphere, and other topics selected from among numerical weather prediction and tropical mesoscale, and middle atmosphere processes according to student interest.]

[EAS 6660 Applied Multivariate Statistics]

Spring. 3 credits. Prerequisites: multivariable calculus, matrix algebra, two statistics courses. Offered alternate years; next offered 2010–2011. D. S. Wilks.]

EAS 6750 Modeling the Soil-Plant-Atmosphere System (also CSS 6750)

Spring. 3 credits. Prerequisite: EAS/CSS 4830 or equivalent. S. J. Riha.

Introduction to the structure and use of soil-plant-atmosphere models. Topics include modeling plant physiology, morphology, and development; potential crop production and crop production limited by moisture and nutrient availability; plant-plant competition; and land surface processes as well as model data requirements, validation, and scale. Discusses use of soil-plant-atmosphere models for teaching, research, extension, and policy formation.

EAS 6920 Special Topics in Atmospheric Science

Fall or spring. 1–6 credits. S–U or letter grades. Staff.

Study of topics in atmospheric science that are more specialized or different from other courses. Special topics covered depend on staff and student interests.

EAS 7110 Upper Atmospheric and Space Physics

Fall or spring. 1–6 credits. Seminar course. D. L. Hysell.

EAS 8500 Master's-Level Thesis Research in Atmospheric Science

Fall or spring. Credit TBA. S–U grades only. Graduate faculty.

This research for atmospheric science master's students.

EAS 9500 Graduate-Level Dissertation Research in Atmospheric Science

Fall or spring. Credit TBA. S–U or letter grades. Graduate faculty.

Dissertation research for atmospheric science Ph.D. students only *before* "A" exam has been passed.

EAS 9510 Doctoral-Level Dissertation Research in Atmospheric Science

Fall or spring. Credit TBA. S–U or letter grades. Graduate faculty.

Dissertation research for atmospheric science Ph.D. candidates *after* "A" exam has been passed.

Science of Earth Systems**Field Study in Hawaii**

Field study is a fundamental aspect of earth system science. Students wishing to increase their field experience may fulfill some of the

requirements for the SES major by off-campus study through the Cornell Earth and Environmental Semester program (EES). The EES program is offered during the spring semester and emphasizes field-based education and research. It is based on the island of Hawaii, an outstanding natural laboratory for earth and environmental sciences. Courses that may be applied to the SES major include EAS 3400, 3220, and 3510. The EES program also offers opportunities for internships with various academic, nonprofit, and government organizations. Typically students participate in the EES program during their junior year, although exceptions are possible. For further information on the EES program see www.geo.cornell.edu/geology/classes/hawaii/course.html.

EAS 1101 Introductory Geological Sciences (To Know Earth)

Fall. 3 credits. C. Andronicos and R. Allmendinger.

Designed to enhance an appreciation of the physical world for nonscientists and science majors. Emphasizes natural environments, surface temperatures, dynamic processes such as mountain belts, volcanoes, earthquakes, glaciers, and river systems. Covers interactions of the atmosphere, hydrosphere, biosphere, and lithosphere (Earth system science). Examines water, mineral, and fuel resources and environmental concerns.

EAS 1108 Earth in the News

Summer. 3 credits. S. L. Losh.

Introduction to physical geology and Earth system science and explores the scientific basis for informed decision making regarding many timely environmental issues including global warming; water pollution and use; geologic hazards such as floods, earthquakes, and volcanoes; fossil fuel distribution and use; and land use. A field trip is taken in the Ithaca area.

EAS 1109 Dinosaurs

Fall. 1 credit. J. L. Cisne.

Introductory survey course for anyone interested in dinosaurs. Lectures examine the fossil evidence and illustrate how various geological and biological disciplines contribute to understanding dinosaurs and their world.

EAS 1190 Fossil Preparation

Fall, 1 credit. Prerequisite: EAS 1109 or related EAS course. W. Allmon and J. Cisne.

Hands-on experience in the preparation and curation of fossils in laboratories at the Paleontological Research Institution (PRI). Students provide own transportation to the Museum of the Earth via public transit or other means. Activities include preparation and study of vertebrate, invertebrate, and plant specimens; sorting of bulk material such as field collections and mastodon dung, and curation of prepared specimens.

EAS 1220 Earthquake! (also ENGR 1220)

Spring. 3 credits. L. D. Brown.

Explores the science of natural hazards, their societal impacts, and means of mitigation. The focus is on earthquakes, volcanoes and tsunamis, but hurricanes, severe weather, climate change, landslides, wildfires and the threat of extinction from a future impact by an extraterrestrial body are also considered.

EAS 1540 Introductory Oceanography—Lecture (also BIOEE 1540)

Fall, summer. 3 credits; optional 1-credit lab offered as EAS/BIOEE 1550. S–U or letter grades. Fall: C. H. Greene and B. Monger; summer: B. Monger.

Intended for both science and nonscience majors. Cover the basic workings of the ocean including its physics, chemistry, and biology. Following this basic description, the course examines threats to the health of the ocean and the important role the ocean plays in global climate change. Nonscience majors should pay particular attention to this course to fulfill a science requirement, because they learn broadly how the Earth works (physically, chemically, and biologically) in a single nonquantitative class.

EAS 1550 Introductory Oceanography—Laboratory (also BIOEE 1550)

Fall. 1 credit. Corequisite: EAS/BIOEE 1540. B. Monger and C. H. Greene.

Laboratory course covering topics presented in EAS/BIOEE 1540.

EAS 1551 Introduction to Oceanography Lab (also BIOSM 1151)

Summer. 1 credit. Prerequisite: college-level science course, or EAS 1540, or marine science course or permission of instructor. B. Monger and C. Greene.

For description, see BIOSM 1151.

EAS 1700 Evolution of the Earth and Life

Spring. 3 credits. J. L. Cisne.

Earth systems and their evolution; Earth history's astronomical context; plate tectonics, continental drift, and their implications for climate and life; coevolution of life and the atmosphere; precedents for ongoing global change; dinosaurs, mass extinctions, and human ancestry. Includes laboratories on reconstructing geological history and mapping ancient geography. Fossil-collecting on field trips.

EAS 2130 Marine and Coastal Geology

Summer. 4 credits. Prerequisite: introductory geology or ecology course or permission of instructor. Staff.

Special two-week course offered at Cornell's Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. For more details, including estimated cost and an application, contact SML office, G14 Stimson Hall, or visit www.sml.cornell.edu.

EAS 2200 The Earth System

Fall, spring. 4 credits. Prerequisites: MATH 1110/1910. Letter grades only. W. M. White and A. Moore.

An integrated introduction to the earth system stressing the biological, chemical, geological, and physical interactions among the atmosphere, ocean, and solid earth. Topics will include biogeochemical cycles, climate dynamics, and the evolution of the atmosphere, biosphere, cryosphere (ice), hydrosphere (oceans and inland waters), and lithosphere (solid earth).

EAS 2220 Seminar: Hawaii's Environment

Fall. 1 credit. S–U grades only. A. Moore.

A seminar for students interested in the unique environmental systems of the Hawaiian Islands. This course is designed to bring together students returning from field studies in Hawaii with students interested in going there to study. Through reading and discussion we will explore the geology,

biology, ocean, atmosphere, and culture of the Hawaiian environment.

EAS 3010 Evolution of the Earth System

Fall. 4 credits. Prerequisites: EAS 2200, MATH 1110 or 1910 and one course in chemistry (college or high school) Two Sat field trips. T. Jordan, S. Riha, and W. Allmon.

Life activities alter the physical and chemical environment and are altered by that environment. This interaction over very long times constitutes a co-evolution of earth and life. Course uses modern systems, tens of thousand year old systems, and hundreds of million year old systems to illustrate principles, methods of reconstructing deep history, and the context of natural change inherent to life and earth.

EAS 3030 Introduction to Biogeochemistry (also NTRES 3030)

Fall. 4 credits. Prerequisites: CHEM 2070 or equivalent, MATH 1120, and biology and/or geology course. J. Yavitt.

Control and function of the Earth's global biogeochemical cycles. Begins with a review of the basic inorganic and organic chemistry of biologically significant elements, and then considers the biogeochemical cycling of carbon, nutrients, and metals that take place in soil, sediments, rivers, and the oceans. Topics include weathering, acid-base chemistry, biological redox processes, nutrient cycling, trace gas fluxes, bio-active metals, the use of isotopic tracers, controls on atmospheric carbon dioxide, and mathematical models. Interactions between global biogeochemical cycles and other components of the Earth system are discussed.

EAS 3040 Interior of the Earth

Spring. 3 credits. Prerequisite: EAS 2200 or permission of instructor. C. Andronicos.

This class will investigate the geology of the solid earth with emphasis on igneous and metamorphic petrology, structure of the continents and ocean basins, and large-scale tectonics. Interaction between deformation, melt generation, and metamorphism will be examined as mechanisms by which the crust is differentiated from the underlying mantle. Geophysical and geochemical techniques for probing the deep interior of the earth will be investigated. Plate tectonics will be used as a unifying theme to understand processes operating in the solid earth.

EAS 3060 Evolution of Ancient and Modern Oceans (also BIOSM 3060)

Summer. 6 credits. Prerequisites: introductory biology (two semesters) and college-level course in Earth science, or permission of instructor. W. Allmon.

For description, see BIOSM 3060.

EAS 3220 Biogeochemistry of the Hawaiian Islands

Spring. 4 credits. Prerequisites: enrollment in EES semester in Hawaii; EAS 2200, EAS 3030 or permission of instructor.

L. A. Derry.

A field-oriented study biogeochemistry course held on the island of Hawaii. Field, class, and laboratory work focus on how landscape age and climate strongly control biogeochemical cycling and ecosystem development in Hawaii. Other topics include succession of ecosystems, evolution of nutrient cycles, and impacts of invasive species. The course is structured around field projects, carried out both as groups and individually.

EAS 3400 Field Study of the Earth System

Spring. 6 credits. Prerequisites: enrollment in EES Semester in Hawaii, one semester of calculus (MATH 1910/1920 or 1110/1120), and two semesters of any of the following: PHYS 2207/2208 or 1112/2213; CHEM 2070/2080 or 2090/2080; BIOG 1101/1103–1102/1104 or 1105/1106 or 1109/1110 or equivalent course work. A. Moore.

Interdisciplinary field course covering fundamental concepts of the Earth system. Topics include global circulation patterns in the solid Earth, atmosphere and ocean; energy and mass transfer; change and variability of Earth atmosphere and ocean systems; the temporal record of change preserved in the geologic record; Earth/ocean/atmospheric controls on ecosystem processes. The course is project-based with students engaged in hands-on, active learning that takes advantage of local resources.

EAS 3500 Dynamics of Marine Ecosystems (also BIOEE 3500)

Fall. 3 credits. Prerequisites: one year of calculus and one semester of oceanography (i.e., BIOEE/EAS 1540) or permission of instructor. Offered alternate years. C. H. Greene and R. W. Howarth.

Lecture course covering the interactions of physical and biological processes in marine ecosystems.

EAS 3510 Conservation Oceanography (also BIOEE 3510)

Spring. 4 credits. Prerequisite: EAS 3400. Recommended: oceanography course. C. H. Greene and C. D. Harvell.

Covers the interactions of physical and biological processes in marine ecosystems. Begins by looking at these processes on ocean-basin to regional scales and works down to the smaller scales relevant to individual organisms. Introduces students to modern techniques of marine-ecosystems research, including remote sensing, oceanographic-survey methods, and experimental marine ecology. This course is field and laboratory intensive with students engaged in hands-on, active learning that takes advantage of local resources.

[EAS 3530 Physical Oceanography

Fall. 3 credits. Prerequisites: MATH 1120 or 1920, or one year of physics, or permission of instructor. Offered alternate years. B. Monger.

The course covers thermohaline and wind-driven circulation and surface-ocean boundary-layer dynamics. Mathematical expressions for describing conservation of momentum, mass, and heat in a fluid are used to explain the ocean's responses to wind and buoyancy forcing.]

EAS 4010 Fundamentals of Energy and Mineral Resources

Fall. 3 credits. Recommended: previous course in geology. L. Cathles.

The Earth's energy and mineral resources reflect some of the most important changes and dramatic events that have punctuated earth history. Course provides an overview of resource types in the context of the Earth's atmospheric evolution, rifting, mantle convection, and hydrologic cycle. The processes of resource accumulation are described in terms of simple chemical and physical principles and in the societal

contexts of supply, demand, and sustainability.

[EAS 4040 Geodynamics]

Spring. 3 credits. Prerequisite: calculus and calculus-based physics courses or permission of instructor. Offered alternate years; next offered 2010–2011. J. Phipps-Morgan.

Quantitative study of the deformation, heat transport, and melting processes that have shaped the evolution of the solid Earth. Familiar physical and chemical principles and concepts are applied to the study of plate tectonics, fluid dynamics, mantle convection, melting, and mountain building.]

[EAS 4050 Active Tectonics]

Spring. 3 credits. Recommended: mechanical background equivalent to EAS 4260/4880. Offered alternate years. R. Lohman.

Develops the ideas and methods necessary to understand how the Earth deforms—from individual earthquakes to the construction of mountain ranges. Discusses the driving forces of deformation, and how these forces interact with different geologic materials to cause deformation.

[EAS 4060 Marine Geology and Geophysics]

Spring. 4 credits. Prerequisite: EAS 2200 or comparable courses. Recommended: completion of some EAS classes. Offered alternate years. J. Phipps-Morgan.

This course will use geological, geochemical, and geophysical approaches to explore the geology of the ocean floor. We will begin by discussing in depth the mid-ocean ridge system where the basaltic seafloor is created by plate spreading. This complex system involves a rich interplay of volcanism, hydrothermal flow, mantle flow, and lithosphere deformation, and is responsible for both the architecture of the ocean crust and the chemical composition of seawater. After this, we will discuss the evolution of the seafloor during its residence at Earth's surface. We end up by discussing the complex faulting, melting, and fluid flow processes at subduction zones where seafloor is transmuted into mantle and crust. There will be a lab section focusing on the use of GMT to make maps of relevant geological and geophysical information.]

[EAS 4170 Field Mapping in Argentina]

Summer. 4 credits. Prerequisite: introductory EAS course and EAS 4260 or EAS 3040. S. Mahlburg Kay.

Field mapping course in Argentina that fulfills field requirement for majors with interests in geological sciences and provides a field geological experience for others. Course consists of lectures in Buenos Aires followed by field exercises in the Sierras Pampeanas, Precordillera, and Main Cordillera Ranges of the Argentine Andes in the provinces of San Juan and Mendoza. A variety of exercises use modern techniques in the field mapping of a broad range of variably deformed sedimentary, metamorphic, and igneous rocks. The course further provides an introduction to the tectonics and magmatic processes of the central Andes with emphasis on comparable processes in the United States. Exercises are done in combination with students and faculty of the University of Buenos Aires.

[EAS 4250 European Discovery of Impacts and Explosive Volcanism]

Spring. 2 credits. Prerequisite: junior, senior, or graduate students with background in geology and permission of instructor. Letter grades only. Meets one day per week plus field trip during spring break. Fee probably charged for required weeklong field trip. Offered alternate years; next offered 2010–2011. J. Phipps Morgan.]

[EAS 4260 Structural Geology]

Spring. 4 credits. Prerequisite: one semester of calculus plus introductory geology course, or permission of instructor. One weekend field trip. C. Andronicos.

[EAS 4340 Exploration Geophysics]

Fall. 3 credits. Prerequisites: MATH 1920 and PHYS 2208, 2213, or equivalent. Offered alternate years; next offered 2010–2011. L. D. Brown.

Fundamentals of subsurface imaging by geophysical methods as used in oil exploration and environmental investigations.]

[EAS 4370 Geophysical Field Methods (also ARKEO 4370)]

Fall. 3 credits. Prerequisites: PHYS 2208 or 2213, or permission of instructor. Offered alternate years. L. D. Brown.

Field exercises using geophysical techniques to probe the subsurface.

[EAS 4400 Seminar on Climate Change Science, Impacts, and Mitigation]

Fall. 2 credits. Prerequisites: junior or higher standing. Offered alternate years; next offered 2010–2011. N. Mahowald.

The course will focus on reading, understanding, and evaluating the IPCC report (2007 version).]

[EAS 4530 Mineralogy]

Fall. 4 credits. Prerequisite: CHEM 2070 or 2090 or permission of instructor. S. Mahlburg Kay.

Chemical and physical properties and identification of minerals with emphasis on the rock-forming minerals that are the principal constituents of the Earth and nearby planets. Topics include internal and external crystallography, crystal chemistry, introductions to x-ray crystallography and optical mineralogy, and a systematic examination of the structures, chemistry, and occurrence of the rock-forming minerals. Independent project includes use of electron microprobe (EPMA) and x-ray facilities.

[EAS 4540 Petrology and Geochemistry]

Spring. 3–4 credits. Prerequisite: EAS 4530. Offered alternate years; next offered 2010–2011. R. W. Kay.

Principles of phase equilibrium as applied to igneous and metamorphic systems. Distribution of trace elements and isotopes as used to define processes and chronologies. Kinetics, reaction pathways, and textural and mineralogical characterization. Geochemistry, origin, and dating of igneous and metamorphic rocks as applied to the formation and evolution of the earth, terrestrial planets, and meteorites.]

[EAS 4550 Geochemistry]

Fall. 4 credits. Prerequisites: CHEM 2070 or 2090 and MATH 1920 or equivalent. Recommended: EAS 3040. Offered alternate years. W. M. White.

The Earth from a chemical perspective.

[EAS 4580 Volcanology]

Fall. 3 credits. Prerequisite: EAS 3040 or equivalent. Offered alternate years; next offered 2010–2011. R. W. Kay.

Causes of volcanism, melting in the Earth, and the origin of magmas. Physical volcanology, nature, and types of volcanic eruptions and associated deposits, and eruption mechanisms. Volcanic plumbing systems, magma chamber processes, evolution of magma. Volcanism and impact phenomena in the solar system. Volcanic hazard assessment and volcano monitoring. Ore deposits associated with volcanism.]

[EAS 4600 Late Quaternary Paleocology]

Fall. 4 credits. Offered alternate years; next offered 2010–2011. M. Goman.

Explores topics in Late Quaternary paleocology. Broadly divides into sections: (1) lectures that cover a variety of topics, such as philosophy of paleocology, radiometric dating methods, and paleoenvironmental proxies; (2) field- and laboratory-based research. The field research provides students with hands-on experience in sediment core collection; while in the laboratory students learn the basics of core description, pollen, and macrofossil analysis.]

[EAS 4610 Paleoclimate: Since the Last Ice Age]

Fall. 3 credits. Prerequisites: EAS 2200 or permission of instructor. Offered alternate years. M. Goman.

This course examines changes and variability in climate for the last 21,000 years.

[EAS 4620 Marine Ecology (also BIOEE 4620)]

Fall. 3 credits. Limited to 75 students. Prerequisite: BIOEE 2610. Offered alternate years; next offered 2010–2011.

C. D. Harvell and C. H. Greene.

For description, see BIOEE 4620.]

[EAS 4710 Introduction to Groundwater (also BEE 4710)]

Spring. 3 credits. Prerequisite: MATH 2930, fluid mechanics or hydrology course.

Offered alternate years; next offered 2010–2011. L. M. Cathles and T. S. Steenhuis.

Intermediate-level study of aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, groundwater hydraulics, soil water, and solute transport.]

[EAS 4750 Special Topics in Oceanography]

Fall, spring, summer. 2–6 credits, variable.

Prerequisites: one semester of oceanography and permission of instructor. Fall, spring: C. H. Greene; summer: B. Monger.

Undergraduate instruction and participation in advanced areas of oceanographic research. Topics change from semester to semester. Contact instructor for further information.

[EAS 4760 Sedimentary Basins]

Spring. 3 credits. Prerequisite: EAS 3010 or permission of instructor. Offered alternate years. T. E. Jordan.

The focus is on the physical characteristics of sedimentary basins, which host fossil fuels and groundwater, and can potentially store CO₂.

EAS 4780 Advanced Stratigraphy

Fall. 3 credits. Prerequisite: EAS 3010 or permission of instructor. Offered alternate years; next offered 2010–2011.
T. E. Jordan.

Covers modern improvements on traditional methods of the study of ages and of genetic relations among sedimentary rocks, emphasizing 3-D relationships. Introduces techniques and applications of sequence stratigraphy.]

EAS 4790 Paleobiology (also BIOEE 4790)

Spring. 4 credits. Prerequisites: one year of introductory biology and BIOEE 2740 or 3730 or EAS 3010, or permission of instructor. W. D. Allmon.

Surveys the major groups of organisms and their evolutionary histories. Intended to fill out the biological backgrounds of Earth and atmospheric science students concerning the nature and significance of the fossil record for their respective studies.

EAS 4840 Inverse Methods in the Natural Sciences

Fall. 3 credits. Prerequisites: MATH 2940. D. L. Hysell.

An exploration of solution methods for inverse problems with examples taken from geophysics and related fields, with particular attention to making inferences from inaccurate, incomplete, or inconsistent physical data.]

EAS 4870 Introduction to Radar Remote Sensing (also ECE 4870)

Spring. 3 credits. Prerequisite: PHYS 2208 or 2213 or equivalent or permission of instructor. D. L. Hysell.

Fundamentals of radar, antennas, and remote sensing. Exposes students to the principles underlying the analysis and design of antennas used for communication and for radar-related applications. Students also encounter both a mathematical and a practical description of how radars function, how their performance can be optimized for different applications, and how signals acquired by them can be processed. The objective is to familiarize students with a wide variety of radars rather than to turn them into practicing radar engineers. Each topic is developed from basic principles so students with a wide variety of backgrounds are able to take the course. Emphasizes radar applications in geophysics, meteorology and atmospheric sciences, and astronomy and space sciences. Gives special attention to radar remote sensing of the Earth from spacecraft.

EAS 4880 Global Geophysics

Spring. 3 credits. Prerequisites: MATH 1920 (or 1120) and PHYS 2208 or 2213. Offered alternate years. M. Pritchard and R. Lohman.

Covers global tectonics and the deep structure of the solid Earth as revealed by investigations of earthquakes, earthquake waves, the Earth's gravitational and magnetic fields, and heat flow.

EAS 4910–4920 Undergraduate Research

Fall, spring. 1 to 4 credits. Fill out form at 2124 Snee Hall. Staff (J. L. Cisne, coordinator).

Introduction to the techniques and philosophy of research in geological sciences and an opportunity for undergraduates to participate in current faculty research

projects. Topics chosen in consultation with, and guided by, a faculty member. A short written report is required, and outstanding projects are prepared for publication.

EAS 4960 Internship Experience

Fall, spring. 2 credits. Prerequisite: enrollment in EES semester in Hawaii and EAS 3400. S–U grades only. A. Moore.

During the last 3.5 weeks of the semester students carry out a service-learning project with a local NGO, environmental business, government agency, research lab, or educational facility. Projects are carefully designed with the student, sponsoring agency, and faculty member. A final report is required.

EAS 4980 Teaching Experience in Earth and Atmospheric Sciences

Fall, spring. 1–4 credits. S–U grades only. Students must register using independent study form. Staff.

EAS 5000 Design Project in Geohydrology

Fall, spring. 3–12 credits. Alternative to industrial project for M.Eng. students choosing geohydrology option. May continue over two or more semesters. L. M. Cathles.

EAS 5020 Case Histories in Groundwater Analysis

Spring. 4 credits. L. M. Cathles.

Groundwater flow in a specific area, such as a proposed nuclear-waste disposal site, is analyzed in depth. Geological and resource data on the area are presented early in the course. Then the material is analyzed by students working as an engineering analysis team. Each student makes a weekly progress report and writes part of a final report. Results are presented in a half-day seminar at the end of term.

EAS 5050 Fluid Dynamics in the Earth Sciences

Spring. 3 credits. Prerequisites: MATH through 2940, PHYS through 2208 or 2214, or permission of instructor. Offered alternate years. L. Cathles and M. Wysocki.

The Earth system provides many fascinating examples of fluid dynamic phenomena that are also of societal importance. Turbulent convection in the outer core generates the earth's magnetic field. The viscous mantle (outer half of the Earth) is slowly but vigorously convecting, and consequently the Earth's surface is dynamic. Viscosity is not important in the oceans and atmosphere, but the flow there is fast enough for the rotation of the Earth to become a dominant control. Electromagnetic effects again dominate in the solar wind and magnetosphere. This course will investigate the Earth using fluid dynamics. For students in the Earth sciences it will provide an opportunity to learn the insights that can be provided by fluid dynamics. For students who know fluid dynamics from other fields it will provide some spectacular applications and an opportunity to learn about the Earth system in a different and unusually fundamental way.

EAS 5110 Earth System Interactions

Fall. 1 credit (S–U grades) or 2 credits (includes paper, letter grades).

Prerequisite: permission of instructor. J. L. Cisne.

New ways of conceptualizing, characterizing, and measuring phenomena can be as

important as new instruments or empirical discoveries in opening new areas to exploration or established ones to more rigorous investigation. This seminar aims to prepare seniors and beginning graduate students for independent research on Earth systems by analyzing examples ranging from epoch-making classics to work now appearing in the literature.

EAS 5220 Advanced Structural Geology I

Fall. 3 credits. Prerequisites: EAS 4260 and permission of instructor. Offered alternate years. R. W. Allmendinger and C. Andronicos.

Stress-strain theory and application. Advanced techniques of structural analysis. Topics include finite and incremental strain measurement; microstructure, preferred orientation, and TEM analysis; pressure solution and cleavage development; and experimental deformation. Applications to deformation of unconsolidated sediments, brittle and brittle-ductile deformation of supracrustal strata, and ductile deformation of high-grade metamorphic rocks. Kinematic analysis of shear zones and folds in these regimes.

EAS 5240 Advanced Structural Geology II

Fall. 3 credits. Prerequisites: EAS 4260 and permission of instructor. Offered alternate years. R. W. Allmendinger.

Geometry, kinematics, and mechanics of structural provinces.

EAS 5530 Advanced Petrology

Fall. 3 credits. Prerequisite: EAS 4540. Offered alternate years R. W. Kay.

EAS 5540 Advanced Mineralogy

Spring. 3 credits. Prerequisites: EAS 4530 or permission of instructor. Offered alternate years. S. Mahlburg Kay.

Advanced crystallography and crystal chemistry of minerals and methods of their study. Intended to follow EAS 4530 or equivalent. Includes X-ray diffraction, optical and electron microprobe methods and can include other more advanced techniques. Concentration is on chemistry and structures of minerals and their use in understanding the thermal and pressure structure and evolution of the Earth and other planets. Includes an individual research project.

EAS 5750 Planetary Atmospheres (also ASTRO 6575)

Fall. 4 credits. Prerequisites: undergraduate physics, vector calculus. Offered alternate years; next offered 2010–2011. P. Gierasch.

Introduction to radiative transfer in emitting and scattering atmospheres in the solar system. Introduction to motions in atmospheres. Planetary examples of balanced flows. Mesoscale waves, wave absorption and wave accelerations. Planetary waves. The influence of wave accelerations on thermal structure and composition. Introduction to atmospheric chemistry. Dynamical transports. Observation. At the level of Andrews, *Atmospheric Physics*.]

EAS 5770 Planetary Surface Processes (also ASTRO 6577)

Spring. 3 or 4 credits. Offered alternate years. J. Bell.

[EAS 5780 Planet Formation and Evolution (also ASTRO 6578)]

Fall. 4 credits. Prerequisites: familiarity with elementary physics and math or permission of instructor. Offered alternate years. J-L. Margot and M. Pritchard. For description, see ASTRO 6578.]

[EAS 5840 Inverse Methods in the Natural Sciences]

Fall. 3 credits. Prerequisites: MATH 2940. ((Next offered ???)) D. L. Hysell. An exploration of solution methods for inverse problems with examples taken from geophysics and related fields, with particular attention to making inferences from inaccurate, incomplete, or inconsistent physical data.]

EAS 5880 Advanced Methods in Radar

Fall. 3 credits. Prerequisite: EAS 4870 or permission of instructor. D. Hysell. This course will address the theory and practice of advanced radar techniques used for remote sensing, with emphasis placed on studying the upper atmosphere and ionosphere. Roughly the first half of the course will be devoted to incoherent scatter theory, the theory that relates the statistics of the signals scattered from an ionospheric plasma to the state variables that describe the plasma. The second half of the course will examine methods for measuring ionospheric parameters using incoherent scatter theory in concert with advanced radar modes and data analysis techniques. Students taking this course should be familiar with radar fundamentals and plasma kinetic theory.

EAS 6280 Geology of Orogenic Belts

Spring. 3 credits. Prerequisite: permission of instructor. S. Mahlburg Kay. Seminar course in which students study specific geologic topics of an orogenic belt selected for study during the semester.

[EAS 6410 Analysis of Biogeochemical Systems]

Spring. 2 credits. Prerequisite: MATH 2930 or permission of instructor. Offered alternate years; next offered 2010-2011. L. A. Derry. Covers dynamics of biogeochemical systems; kinetic treatment of biogeochemical cycles; box models, residence time, response time; analytical and numerical solutions of model systems.]

[EAS 6560 Isotope Geochemistry]

Spring. 3 credits. Open to undergraduates. Prerequisite: EAS 4550 or permission of instructor. Offered alternate years; next offered 2010-2011. W. M. White. Nucleosynthetic processes and the isotopic abundance of the elements; geochronology and cosmochronology using radioactive decay schemes.]

EAS 6930 Special Topics in Geological Sciences

Fall or spring. 1-3 var. credits. S-U or letter grades. Staff. Study of specialized advanced topics in the Earth sciences through readings from the scientific literature, seminars, and discussions.

EAS 7000-7990 Seminars and Special Work

Fall, spring. 1-3 credits. Prerequisite: permission of instructor. Staff. Advanced work on original investigations in earth and atmospheric sciences. Topics change from semester to semester. Contact appropriate professor for more information.

EAS 7220 Advanced Topics in Structural Geology

R. W. Allmendinger.

EAS 7310 Advanced Topics in Remote Sensing and Geophysics

M. Pritchard.

EAS 7330 Advanced Topics in Geodynamics

Spring. J. Phipps Morgan.

EAS 7500 Satellite Remote Sensing in Biological Oceanography

Summer. 3 credits. B. C. Monger.

EAS 7510 Petrology and Geochemistry

R. W. Kay.

EAS 7550 Advanced Topics in Tectonics and Geochemistry

J. Phipps Morgan.

EAS 7570 Current Research in Petrology and Geochemistry

S. Mahlburg Kay.

EAS 7620 Advanced Topics in Paleobiology

W. D. Allmon.

EAS 7650 Topics in Paleoecology

Fall. 1 credit. S-U grades. G. Dietl.

EAS 7710 Advanced Topics in Sedimentology and Stratigraphy

T. E. Jordan.

EAS 7730 Paleobiology

J. L. Cisne.

EAS 7750 Advanced Topics in Oceanography

C. H. Greene.

EAS 7800 Earthquake Record Reading

Fall. M. Barazangi and R. Lowman.

EAS 7810 Advanced Topics in Exploration Geophysics

L. D. Brown.

EAS 7930 Andes-Himalaya Seminar

S. Mahlburg Kay, R. W. Allmendinger, T. E. Jordan, and M. Pritchard.

EAS 7950 Low Temperature Geochemistry

L. A. Derry.

EAS 7960 Geochemistry of the Solid Earth

W. M. White.

EAS 7970 Fluid-Rock Interactions

L. M. Cathles.

EAS 7990 Soil, Water, and Geology Seminar

Spring. L. M. Cathles and T. S. Steenhuis.

EDUCATION

A. Wilson, chair (435 Kennedy Hall, 255-2207); G. Applebee, R. Caffarella, W. Camp, M. Constas, B. Crawford, T. Park, S. Peters, T. Richardson, R. Ripple, V. Rockcastle, D. Schrader, J. Sipple, D. Trumbull, T. Tucker, S. Villenas

[EDUC 1110/1111 Exploring Agricultural Education and Research]

Fall and spring. 2 credits. Year-long course. Letter grades only. Next offered 2010-2011. W. Camp. Educational, career, and research opportunities; independent research; CALS

admissions, career, student services; interview agricultural professionals; participate in team projects; write papers; a research project for presentation.]

EDUC 2200 Community Learning and Service Partnership (CLASP)

Fall only. 2 credits. Prerequisite: permission of instructor. Students must commit to taking EDUC 2210 the following spring. S-U or letter grades. A. Wilson.

In this service-learning course, students partner with Cornell service staff to accomplish a variety of learning goals selected by the employees. Students are introduced to the field of adult basic education and the principles of the Community Learning and Service Partnership (CLASP). Seminars examine the issues of learning through service and reflection, adult teaching philosophy and practice, and empowerment through education. Students must commit to continuing their service by taking EDUC 2210 the following spring semester.

EDUC 2210 Community Learning and Service Partnership (CLASP)

Spring only. 2-4 credits, variable. Prerequisites: EDUC 2200 and permission of instructor. S-U or letter grades. A. Wilson.

Continues the field experience and curriculum begun in EDUC 2200. Students work with Cornell service staff to accomplish a variety of learning goals selected by the employees. Students receive in-service training and support. Seminars examine the impact of gender, race, and social class on learning and educational opportunity.

EDUC 2400 The Art of Teaching (CA)

Fall and spring. 3 credits. T. Richardson and D. Trumbull.

This exploratory course is designed for students of all backgrounds and interests who have a desire to learn more about education and teaching. Teaching takes place in a variety of contexts from the family to the workplace, and this course endeavors to examine the elements of teaching that transcend the typical school-teaching environment. Designed to guide students in reflecting upon their experiences to help them better understand the decisions they make as teachers. Students have the opportunity to pursue their own interests through a teaching fieldwork assignment. Possible field experiences range from large group to tutorial situations, from preschool to adult education, from traditional school subject matters to recreational and occupational areas, and from school-based to nonformal situations. The course work and readings are designed to build on these experiences throughout the semester and provide concepts and skills to apply in the field.

EDUC 2710 Social and Political Context of American Education (also SOC/AMST 2710) (HA) (SBA)

Fall. 4 credits. Disc. J. Sipple. Examines the goals, roles, inputs, and outcomes of schooling in American society and the policy environment in which schools operate. Analyzes controversies and tensions (e.g., equity, market forces, state control) surrounding public education at local, state, and federal levels. Includes current and historical, urban and rural issues and problems.

EDUC 3110 Educational Psychology (also HD 3110) (KCM) (CA)

Fall. 4 credits. Prerequisite: PSYCH 1101 or permission of instructor. S–U or letter grades. Additional disc sec TBA. D. Schrader.

Educational psychology is the application of psychological concepts to educational settings. This course examines the dynamic interaction between people as teachers and learners, schools as social and learning environments, and the sociocultural contexts that influence learning. The focus is on those interactions in cognitive, epistemic, social, moral, and personal domains in educational contexts.

[EDUC 3310 Careers in Agriculture, Extension, and Adult Education]

Fall. 3 credits. Letter grades only. Next offered 2010–2011. G. Applebee.

Designed to examine program development, methodologies, leadership, evaluation, and implementation in three areas of teaching: adult education, cooperative extension, and agricultural education.]

EDUC 3350 Youth Organizations (CA)

Fall. 3 credits. T. Park.

Visionary, creative, and competent leaders are essential for youth organizations. Class participants learn how to facilitate both youth and adult volunteer leadership development. They examine factors affecting membership, purposes, design, operation, and administration of youth organizations. The course provides students with in-depth learning-by-doing experience of how youth organizations function. Requires field experience with a recognized youth organization.

EDUC 4040 Learning and Teaching I

Fall. 4 credits. Prerequisite: admission to Cornell Teacher Education program or permission of instructor. Letter grades. D. Trumbull.

Designed to foster development of pedagogical and reflective understanding crucial to good teaching. Students explore what it means to understand and teach through examining key disciplinary topics, which requires rethinking disciplinary knowledge, assessment of learning, and motivation. Required fieldwork (4 hours weekly) focuses on students' understandings of pupils and classroom structures.

EDUC 4050 Learning and Teaching II

Spring. 4 credits. Prerequisite: admission to Cornell Teacher Education program or permission of instructor. Letter grades. B. Crawford.

Important part of a sequence of courses and experiences intended to lead to excellence in science, agricultural science, and mathematics teaching. Prospective teachers develop understanding and skills in effective planning, instruction, and assessment of students studying agricultural science, mathematics, and science in middle and high school. The course is intended to integrate theory and practice associated with learning and teaching in school classroom settings and includes a minimum of 40 hours of fieldwork in area classrooms.

EDUC 4200 Field Experience

Fall or spring. 1–4 credits. Undergraduates must attach to their course enrollment material written permission from faculty member who will supervise work and assign grade. S–U or letter grades. Staff.

Students may engage in planned, semiprofessional, or professional practice in an educational enterprise. Each student prepares a plan of action including rationale, purposes, and procedures and arranges with a faculty member to supervise and evaluate their field experience.

EDUC 4410 Language, Literacy, and Schooling (KCM)

Spring and summer. 3 or 4 credits. Lab TBA. T. Park.

Foundation for literacy activities in secondary education. Examines current research, policy, and practice relating to the acquisition of first and second languages, the dynamics of literacy in school contexts, and the development of academic language proficiency. The fourth credit hour requires a research project based on fieldwork.

EDUC 4510 Multicultural Issues in Education (also AMST/LSP 4510)

Fall. 3 credits. Letter grades. S. Villenas.

This course explores research on race, ethnicity, and language in American education. It examines historical and current patterns of minority school achievement and the cultural premises undergirding educational practices in diverse communities and schools. Policies, programmatic and pedagogical responses to diversity, including multicultural and bilingual education, are addressed.

EDUC 4590 Educational Innovations in Africa and the Diaspora (also ASRC 4601)

Fall. 3 credits; 4 in College of Arts and Sciences. N. Assié-Lumumba.

For description, see ASRC 4601.

EDUC 4630 Policies, Practices, and Critical Issues of Distance Learning in Developing Countries

Summer. 3 credits. S–U or letter grades. N. Assié-Lumumba.

Distance learning is increasingly being adopted to respond to the high demand for education in developing countries. This course critically analyzes distance education for the general population as well as specific social and professional categories. A typology of the ICTs (information and communication technologies) used and the different forms of virtual learning institutions are examined. Case studies include single-mode and dual-mode institutions in Africa, Asia, and Latin American countries and also eLearning programs designed in industrial countries for developing countries.

EDUC 4720 Philosophy of Education

Fall. 3 credits. Advanced undergraduates permitted. Letter grades only. T. Richardson.

Discussions for this course will be organized around a wide variety of philosophical positions which have influenced scholarly approaches to philosophy of education during the 20th century. We will be concerned primarily with the development of John Dewey's humanist approach to educational philosophy and the post-humanist philosophical positions from Continental post-colonial and feminist philosophies that have emerged in response to it.

EDUC 4940 Special Topics in Education

Fall, spring, or summer. 4 credits max. Prerequisite: permission of instructor. S–U or letter grades. Staff.

The department teaches "trial" courses under this number. Offerings vary by semester and

will be advertised by the department before the semester starts. Courses offered under this number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

EDUC 4970 Individual Study in Education

Fall, spring, or summer. 1–3 credits. S–U or letter grades. Students must register using independent study form (available in 140 Roberts Hall). Staff.

A student may, with approval of a faculty advisor, study a problem or topic not covered in a regular course or may undertake tutorial study of an independent nature in an area of educational interest.

EDUC 4980 Undergraduate Teaching

Fall or spring. 1 or 2 credits; 4 credits max. during undergraduate career.

Prerequisite: GPA of at least 2.7. S–U or letter grades. Students must register using independent study form (available in 140 Roberts Hall). Staff.

Participating students assist in teaching a course allied with their education and experience. Students are expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

EDUC 4990 Undergraduate Research

Fall, spring, or summer. 6 credits max. during undergraduate career. Not open to students who have earned 6 or more undergraduate research credits elsewhere in the college. Prerequisite: junior or senior standing; GPA of at least 2.7. Students must register using independent study form (available in 140 Roberts Hall). Staff.

Affords opportunities for students to carry out independent research under appropriate supervision. Each student is expected to review pertinent literature, prepare a project outline, conduct the research, and prepare a report.

EDUC 4991 Independent Honors Research in Social Science

Fall or spring. 1–6 credits; max. 6 credits may be earned in honors program. Prerequisite: requirements for honors program met. S–U or letter grades. Staff.

EDUC 5020 Education and Development in Africa (also ASRC 5020)

Spring. 3 credits; 4 in College of Arts and Sciences. S–U or letter grades. N. Assié-Lumumba.

For description, see ASRC 5020.

EDUC 5030 Diversity in the Classroom

Spring or summer. 2–4 credits. Prerequisite: enrollment in CTE program or permission of instructor. S–U or letter grades. S. Villenas.

Builds on knowledge of cultural diversity gained from prior course work and field activities. With a focus on classroom teaching, topics include learning and inequality, multiple literacies across home and school, culturally relevant teaching, and English-language learners. A service learning component is optional for 3 or 4 credits.

EDUC 5320 Educational Programs in Agricultural Science

Fall. 3 credits. Next offered 2011-2012. W. Camp.

Organization and planning processes for public school agricultural education. Local needs assessments, advisory committees, community-partnering, course development, sequencing instruction, professional development. Fieldwork required.]

EDUC 5350 Youth Organizations for Agricultural Science Education

Spring. 3 credits. Prerequisite: senior or graduate standing in Agricultural Science Education. Letter grades only. T. Park.

Provides future agriculture educators a comprehensive overview of the components of an agriculture education program including supervised agricultural experience (SAE) and FFA. Students examine factors affecting membership, purpose, design, operation, and administration of career and technical student organizations and FFA organization, structure, and functions on national, state, and local levels.

EDUC 5440 Curriculum and Instruction

Spring. 3 credits. S-U or letter grades. Next offered 2010-2011. Staff.

The focus of this curriculum and instructional planning course will be on the concepts and principles for developing curriculum and the processes for delivering curriculum.]

EDUC 5710 Social and Political Context of American Education (also SOC/AMST 5710) (HA) (SBA)

Fall. 4 credits. Prerequisites: admission to Cornell Teacher Education Program or permission of instructor. J. Sipple.

Examines the goals, roles, inputs, and outcomes of schooling in American society, and the policy environment in which schools operate. Analyzes controversies and tensions (e.g., equity, market forces, state control) surrounding public education at local, state, and federal levels. Includes current and historical, urban and rural issues and problems.

EDUC 5780 International Teaching Assistant Development Program (ITADP) Training Course: Cross-Cultural Classroom Dynamics, Pronunciation, and Language, Video Teaching Practicum

Fall and spring. 2 credits. S-U grades only. TBA. ITADP staff.

Designed for first-time international teaching assistants from countries in which English is not the first language. Focuses on three areas: cross-cultural classroom dynamics, video teaching practicum, and language—enhancing communicative competence in English. Through small-group seminars and individual conferences, the ITADP helps international teaching assistants develop their linguistic and pedagogical skills as they gain sensitivity to the dynamics of U.S. classrooms.

EDUC 5790 Further Training for International Teaching Assistants

Fall, spring, summer. 2 credits. Prerequisite: EDUC 5780. S-U or letter grades. Lec, three contact hours per week. ITADP staff.

Designed for international teaching assistants from countries in which English is not the first language and who have completed EDUC 5780, the ITADP follow-up course provides further instruction and practice in oral English and pedagogical skills.

EDUC 6010 Secondary Agriculture, Science, and Mathematics Teaching Practicum

Fall or spring. 6 credits. Prerequisite: graduate students enrolled in Cornell Teacher Education Program. S-U grades only. D. Trumbull, B. Crawford, W. Camp, and T. Park.

Supervised student teaching in agriculture, mathematics or science at the secondary level. Program includes teaching in a local school for 14 weeks.

EDUC 6020 Practicum Seminar

Fall or spring. 9 credits. Prerequisite: EDUC 6010 or permission of instructor. W. Camp, B. Crawford, D. Trumbull, and T. Park.

Begins with full-day sessions of intensive consideration of classroom practice relevant to all aspects of student teaching. Assignments and an online seminar during the semester require students to use theories to develop and evaluate teaching materials and practices. Students also complete an extensive portfolio documenting their work.

EDUC 6140 Gender, Context, and Epistemological Development (also FGSS 6240)

Fall. 3 credits. Prerequisite: EDUC/HD 3110 or senior status. S-U or letter grades. Offered alternate years; next offered 2010-2011. D. Schrader.

We explore how our thinking and view of the nature of knowledge is influenced by gender and culture. Awareness shapes decisions, actions, and educational practices.]

EDUC 6160 Moral Psychology and Education (also FGSS 6060)

Fall. 3 credits. Prerequisites: EDUC 3110, graduate standing or permission of instructor. S-U or letter grades. Offered alternate years. D. Schrader.

This seminar examines questions of the psychological development of knowing what is right, just, good, and of value. We study moral development from cognitive-developmental, social-contextual, normative, and gendered perspectives. Topics vary by semester but include the relationship between judgment and action, moral education, social aggression, moral leadership, and integrity.

EDUC 6170 Psychology of Adolescence in Case Study (also FGSS 6180)

Spring. 3 credits. Prerequisite: any one of the following: EDUC 3110, HD 6170, or permission of instructor. S-U or letter grades. D. Schrader.

Adolescent psychological development is examined from the perspective of the individual subject and the researcher. Using a case study approach we explore classic and contemporary theories of adolescence, relying on primary source readings and first-person accounts to give us insight into adolescent issues, such as identity, values, and behaviors.

EDUC 6180 Learning in Adulthood: An Introduction

Fall. 3 credits. S-U or letter grades. R. Caffarella.

An introduction of learning in adulthood is provided with emphasis on understanding adult learning in contemporary society, reviewing key seminal and current theory and research, and exploring how this knowledge relates to practice. Students from other disciplines, in addition to education, who work with adults in formal and informal learning settings are welcomed.

EDUC 6200 Internship In Education

Fall or spring. 1-6 credits. Each student, before course enrollment, must obtain approval of faculty member who will assume responsibility for supervising work. S-U or letter grades. Staff.

Opportunity for practical experience in educational professions development.

EDUC 6330 Program Planning in Adult and Extension Education

Spring. 3 credits. S-U or letter grades. Offered alternate years. A. Wilson.

Examines current social and economic conditions affecting agricultural, extension, and adult education. Applies principles, objectives, strategies, and sources of information to program planning. Participants have an opportunity to observe ongoing programs in agricultural, extension, and adult education and to pursue individual interests in program development and improvement.

EDUC 6470 Innovative Teaching in the Sciences

Spring. 3 credits. S-U or letter grades. B. Crawford.

This seminar on innovative ways to teach is designed for doctoral and master's-level students in education, sciences, math, and possibly other disciplines, including extension and outreach. Readings will include issues of gender and underrepresented populations in science, math, and engineering. Students will design inquiry-based instruction in their field.

EDUC 6510 Anthropology and Education

Spring. 3 credits. Letter grades. Lec. S. Villenas.

A study of schooling and education from anthropological perspectives and ethnographic methodology. Participants examine teaching and learning in families, communities, and schools as cultural processes. Some topics include the differential school achievements of racial/ethnic minorities, school reform efforts, youth culture and identities, and literacy in adult learning spaces.

EDUC 6610 Administrative Leadership and Organizational Change

Fall. 3 credits. J. Sipple.

Perspectives on the administration of educational organizations. Considers social science, legal and ethical theories, and their application to both public schools and higher education. Intended for students who are considering careers as educational administrators, as well as for those who want to further their understanding of educational organizations.

EDUC 6620 Evaluation Design

Spring. 3 credits. Prerequisite: survey of research methods (or other graduate-level class in research methods), statistics. S-U grades only. M. Constas.

This course is designed to introduce graduate students to the principles and practices of program evaluation. It addresses practical realities and political features of a range of evaluation designs that may be used to support decision making related to educational, social, and community-based programs. Students who enroll in the class will become familiar with the technical characteristics, practical realities, and political features of a range of evaluation designs that may be used to support decision making related to educational, social, and community-based programs. Course readings, class

discussions, and assignments will support the development of the proposal.

EDUC 6640 Methods for Interpretive Research

Spring. 3 credits. Prerequisites: course in research methods/research design. S–U or letter grades. D. Trumbull.

Studies interpretive qualitative research, which attends to the complex interactions between researcher, researched, and contexts and accepts the centrality of interpretation in research.

[EDUC 6670 Discourse Analysis in Education

Spring. 3 credits. S–U or letter grades. Next offered 2010–2011. A. Wilson.

Course functions as an advanced study in the theory and practice of conducting discourse analysis in education. Discourse analysis is one of the preferred analytical approaches in cultural studies, but “discourse analysis” means different things to different people. Participants will examine a range of those differences.]

[EDUC 6680 Narrative Inquiry in Social Science and Action Research

Spring. 3 credits. S–U or letter grades. Next offered 2010–2011. S. Peters.

Provides an introduction to the theory and practice of narrative inquiry in action-oriented social science research.]

EDUC 6710 American School Reform: Organizational and Sociological Perspectives

Spring. 3 credits. S–U or letter grades. J. Sipple.

For individuals interested in the role of schools in society and in organizational behavior and public policy. This seminar investigates the sociological functions of schooling, including the stability of school organization given the long history of policy initiatives designed to reform schools. The focus is American K–12 public education, though issues of pre-K, private, and post-secondary education are covered.

EDUC 6720 Philosophy of Education

Fall. 3 credits. Letter grades only. T. Richardson.

Discussions for this course will be organized around a wide variety of philosophical positions that have influenced scholarly approaches to philosophy of education during the 20th century. We will be concerned primarily with the development of John Dewey’s humanist approach to educational philosophy and the post-humanist philosophical positions from Continental Post-Colonial and Feminist philosophies which have emerged in response to it. Advanced undergraduates will be permitted.

EDUC 6800 Foundations of Adult and Extension Education

Fall. 3 credits. Limited to 20 students. S–U or letter grades. Offered alternate years. A. Wilson.

Analysis of alternative purposes, nature, and scope of extension, adult, and continuing education programs in the United States and abroad, with emphasis on the relationship of programs to historical, cultural, political, and social settings. Examines definitions, conceptual controversies, philosophical issues, and current research directions through a seminar approach.

[EDUC 6810 Democracy, Science, and Education

Spring. 3 credits. S–U or letter grades. Next offered 2010–2011. S. Peters.

Explores the actual and potential connections between democracy, science, and education in both formal and non-formal education, both historically and in contemporary society.]

[EDUC 6820 Community Education and Development

Fall. 3 credits. Limited to 25 students. Letter grades only. Next offered 2010–2011. S. Peters.

Reviews traditions of community education and development in their historical, cultural, social, and political contexts, examining implications for practice in a range of settings.]

EDUC 6850 Training and Development: Theory and Practice (also IARD 6850)

Spring. 4 credits. Limited to 20 students. S–U or letter grades. R. Caffarella.

Provides practitioners and researchers conceptions from different perspectives of training and development, primarily in international settings. Engages students in critical and reflective analysis related to adults as learners, training and education at the instructional and program levels, major development issues at national and global levels, and ethical practice. Examines two major themes that drive training and development: the impact of context and the role of power.

EDUC 6940 Special Topics in Education

Fall, spring, or summer. 1–3 credits.

Prerequisite: permission of instructor. S–U or letter grades. Staff.

Topics TBA.

EDUC 6970 Graduate Individual Study in Education

Fall, spring, or summer. 1–3 credits.

Prerequisite: graduate standing; permission of instructor. S–U or letter grades. Staff.

A graduate student may, with approval of a faculty advisor, study a problem or topic not covered in a regular course or may undertake tutorial study of an independent nature in an area of educational interest.

EDUC 6980 Graduate Supervised Teaching in Education

Fall or spring. 1–2 credits. Prerequisite: graduate standing; permission of instructor. S–U or letter grades. Staff.

Participating graduate students assist in teaching a course allied with their education and experience. Students are expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

EDUC 7000 Directed Readings

Fall, spring, or summer. 6 credits, variable.

Prerequisite: graduate standing; permission of instructor. S–U or letter grades. Staff.

For study that predominantly involves library research and independent study.

EDUC 7010 Empirical Research

Fall, spring, or summer. 6 credits, variable. Prerequisite: graduate standing; permission of instructor. S–U or letter grades. Staff.

For study that primarily involves collection and analysis of research data.

EDUC 7020 Practicum

Fall, spring, or summer. 6 credits, variable. Prerequisite: graduate standing; permission of instructor. S–U or letter grades. Staff.

For study that predominantly involves field experience in community settings.

EDUC 7030 Teaching Assistantship

Fall, spring, or summer. 6 credits, variable. Prerequisite: graduate standing; permission of instructor. S–U or letter grades. Staff.

For students assisting faculty with instruction. Does not apply to work for which students receive financial compensation.

EDUC 7040 Research Assistantship

Fall, spring, or summer. 6 credits, variable. Prerequisite: graduate standing; permission of instructor. S–U or letter grades. Staff.

For students assisting faculty with research. Does not apply to work for which students receive financial compensation.

EDUC 7050 Extension Assistantship

Fall, spring, or summer. 6 credits, variable. Prerequisite: graduate standing; permission of instructor. S–U or letter grades. Staff.

For students assisting faculty with extension activities. Does not apply to work for which students receive financial compensation.

EDUC 7620 Comparative and International Education

Summer. 3 credits. S–U or letter grades. N. Assié-Lumumba.

Seminar that critically analyzes education conceived both as a universal social institution and a reflection of cultural, economic, and political dynamics of the local and global contexts. The analysis focuses on policies, organization, and the functioning of education in industrial, new/emerging economies, and developing countries. Specific case studies are drawn from different countries.

EDUC 7830 Farmer-Centered Research and Extension (also IARD 7830)

Fall. 3 credits. S–U or letter grades. T. Tucker.

For description, see IARD 7830.

EDUC 8900 Master’s-Level Thesis Research

Fall or spring. Credit TBA. Each student, before course enrollment, must obtain approval of faculty member who will assume responsibility for guiding work. S–U or letter grades. Times TBA. Staff.

EDUC 9900 Doctoral-Level Thesis Research

Fall or spring. Credit TBA. Each student, before course enrollment, must obtain approval of faculty member who will assume responsibility for guiding work. S–U or letter grades. Times TBA. Staff.

Doctoral or other research and development projects for Ph.D. students.

ENTOMOLOGY

J. G. Scott, chair (2130 Comstock Hall, 255-7723); A. Agrawal, N. W. Calderone, B. N. Danforth, A. DiTommaso, A. Douglas, C. Gilbert, A. E. Hajek, L. C. Harrington, B. P. Lazzaro, J. K. Liebherr, J. E. Losey, J. P. Nyrop, L. S. Raylor, J. S. Thaler, W. M. Tingey

Courses by Subject

Apiculture: 2600, 2640
 Behavior: 2150, 3150, 3250, 3940, 6620
 Ecology: 3690, 4550, 4700, 6900
 Introductory courses: 2010, 2011, 2100, 2120, 2150, 2410
 Medical and veterinary entomology: 2100, 3520, 4100, 4101
 Outreach: 3350, 3360, 7090
 Pathology: 4630, 6700
 Pest management: 2410, 4200, 4440, 6700
 Physiology, development, and toxicology: 3070, 3940, 4830, 4900, 6850
 Systematics: 3310, 3311, 3330, 4400, 6340, 6550

ENTOM 2010/2011 Alien Empire: Bizarre Biology of Bugs

Spring, 2 (2010) or 3 (2011) credits. S-U or letter grades. Optional field trips. Staff. Insects are the most abundant and diverse animals on earth. This course explores the bizarre biology of insects and their interaction with humans. We will examine both the detrimental roles insects play (e.g., pests and vectors of disease) as well as their beneficial roles (e.g., pollination, edible insects, insect products such as waxes, dyes, and silk). We will also explore the symbolic representation of insects in art, literature, and religion. Students taking the course for 3 credits will meet once per week (on Friday) for discussion and documentary films on the biology of insects.

ENTOM 2020 Invasions

Spring, 3 credits. S-U or letter grades. A. E. Hajek and J. P. Nyrop. The purpose of this course is for students to learn about the biology and ecology of invasions by plants, animals, and microbes. We will discuss the expanding problems caused by invasive species and how invasions are prevented, mitigated, and managed. These topics are grounded in biology; however, they have social, economic and philosophical implications. Invasive species impact agriculture, forestry, natural systems, and human health. Local, national, and international examples of invaders in diverse systems will be included in investigations of invasive species.

ENTOM 2100 Plagues and People (also BSOC 2101)

Fall, 2 or 3 credits. Prerequisites: introductory biology or permission of instructor. Offered alternate years. L. C. Harrington. Human diseases transmitted by insects and related forms (arthropods) have affected human lives and society through history. This course focuses on the pathogens, parasites, and arthropods causing human plagues. Those plagues that have had the greatest impact on human culture and expression are emphasized. Lectures are supplemented with readings and films. Also addresses emerging diseases, bioterrorism, and future plagues. Students taking the course for 3 credits participate in readings, presentations/discussions each week (on Fridays), weekly

readings, and quizzes and have a comprehensive final project.

ENTOM 2120 Insect Biology

Fall, 4 credits. Pre- or corequisites: BIOG 1101-1102 or equivalent. Lec, lab. Lab fee: \$50. J. K. Liebherr. Introduces the science of entomology by focusing on basic principles of systematics, morphology, physiology, behavior, and ecology of insects. The laboratory in early fall includes field trips to collect and study insects in the natural environment. Requires a collection emphasizing ecological, behavioral, and taxonomic categories.

ENTOM 2150 Spider Biology: Life on a Silken Thread

Fall, 2 credits. Prerequisite: introductory biology or permission of instructor. S-U or letter grades. Lec. L. S. Raylor. Introduction to the fascinating world of spiders. Explores evolution, ecology, behavior, and physiology of spiders and their close kin from a modern perspective. Topics include identification of major spider families, spiders' unique use of silk, risky courtship, predatory behavior, diverse life styles, social spiders, and potential use in IPM.

ENTOM 2410 Insect Pest Management for Practitioners

Spring, 3 credits. Limited to 18 students. Prerequisites: BIOG 1101-1102 or equivalent. Lec, lab/disc. W. M. Tingey. Introduction to insect pest management in plant or animal protection for those preparing for careers in extension, service, and production. Emphasizes pest monitoring, sight identification, diagnosis, decision-making, and management tactics for the major groups of insect and arthropod pests affecting field, forage, and vegetable crops; floriculture, woody ornamentals, and turf; urban environments and public health; veterinary, dairy, livestock, and poultry. Five off-campus laboratory field trips with demonstrations of pest management decision-making, pest-monitoring tools, and pesticide-application equipment.

[ENTOM 2600 Biology of the Honey Bee

Fall, 2 credits. Lec. Offered alternate years; next offered 2010-2011. N. W. Calderone. Introduces students to the life history, physiology, ecology, and behavior of honey bees. Reviews classical and contemporary research on the dance language, chemical communication, behavioral genetics, division of labor, and evolution of social behavior.]

[ENTOM 2640 Practical Beekeeping

Fall, 1 credit. Limited to 20 students. Pre- or corequisite: ENTOM 2600. Lab. Offered alternate years; next offered 2010-2011. N. W. Calderone. Consists of 14 laboratory sessions that acquaint students with practical methods of colony management. Laboratories involve hands-on work with honey bee colonies and equipment.]

[ENTOM 3070 Pesticides, the Environment, and Human Health (also TOX 3700)

Fall, 2 credits. Prerequisites: BIOG 1101-1102 or equivalent. Lec. Offered alternate years; next offered 2010-2011. J. G. Scott. Survey of the different types of pesticides, their uses, properties, and effects on the environment. Discusses the risks, benefits, regulation, politics, and current controversies

associated with pesticide use and genetically modified crops.]

ENTOM 3150 Spider Biology

Fall, 3 credits. Prerequisite: introductory biology or permission of instructor. Letter grades only. Lec. L. S. Raylor. In-depth introduction to the fascinating world of spiders and their relatives. Meets concurrently with ENTOM 2150 (2 credits). Students in ENTOM 3150 meet for another hour with additional coverage of current topics in arachnology and developing spider identification skills. Entomology majors and biology majors in the Insect Biology program of study should take ENTOM 3150 rather than 2150. Students may not take both ENTOM 2150 and 3150 for credit.

ENTOM 3250 Insect Behavior (also BIONB 3250)

Spring, 3 credits. Prerequisite: introductory biology and either ENTOM 2120 or BIONB 2210. Lec. Offered alternate years. L. S. Raylor.

Insects are the most diverse organisms on earth, with equally diverse behavior. This course explores the behavior of insects, ranging from the individual sensory and physiological mechanisms that are the basis of insect behavior, to the behavioral dynamics of foraging, courtship, parental care, and social behavior. Topics include insect learning, perceptual abilities, host finding strategies, predation, pollination, and examination of current issues in insect behavior.

ENTOM 3310 Insect Phylogeny and Evolution

Fall, 3 credits. Prerequisite: ENTOM 2120. Corequisite: ENTOM 3311. Offered alternate years. B. N. Danforth.

This course will provide a broad overview of insect diversity, morphology, phylogeny, evolution, and fossil history. Evolution of the insects will be discussed in light of real data sets based on morphology and/or DNA sequence data. Basic principles of phylogeny reconstruction using both morphological and DNA sequence data will be presented using published data sets. Analytical methods such as parsimony, maximum likelihood, and Bayesian methods will be discussed and compared. We will also cover how phylogenies are used to analyze evolutionary patterns, such as historical biogeography, co-evolution, and host-parasite relationships.

ENTOM 3311 Insect Phylogeny and Evolution Laboratory

Fall, 1 credit. Prerequisite: ENTOM 2120 lab. Lab fee: \$40. Corequisite: ENTOM 3310. B. N. Danforth. Introduction of the diversity, phylogeny, evolution, and fossil history of insects. Includes lab practice in insect morphology, insect diversity, and phylogenetic analysis. Entomology undergraduates wishing to count this course toward their Group A requirement are required to take the laboratory, as well as the lecture for a total of 4 credits.

ENTOM 3330 Maggots, Grubs, and Cutworms: Larval Insect Biology

Spring, 3 credits. Prerequisites: ENTOM 2120 or permission of instructor. S-U or letter grades. Offered alternate years. J. K. Liebherr.

The evolutionary history of the Holometabola has been greatly informed by attributes of their larvae. This course introduces students to the biology, anatomy, and natural history

of holometabolous insect larvae. The lab includes field sampling, curation of field-collected specimens, and identification of unknowns. Development of a small larval collection required.

ENTOM 3350 Naturalist Outreach Practicum

Fall. 3 credits. Prerequisite: introductory biology. S–U or letter grades. L. S. Rayor. Learn the skills to do effective scientific outreach. This interdisciplinary course combines lectures on topics relevant to teaching about natural history, with more pedagogic lectures on developing and presenting scientific inquiry-based presentations. The course emphasizes developing different approaches to effectively communicate science at different scales from classroom settings, through museum programs, to large outreach events. Students participate in the Naturalist Speakers Bureau to provide lively multimedia presentations in classrooms throughout the region. With feedback from peers and instructors, students develop their own biological presentations, display materials, and teacher resource guides.

ENTOM 3360 Naturalist Outreach in Biology

Fall. 1–2 credits, variable. Prerequisite: ENTOM 3350. S–U or letter grades. L. S. Rayor. For students who have already taken Naturalist Outreach Practicum (ENTOM 3350) who wish to continue doing scientific outreach through the Naturalist Outreach Speakers Bureau. This course can be taken twice.

[ENTOM 3520 Medical and Veterinary Entomology

Fall. 3 credits. Prerequisites: BIOG 1101–1102 or permission of instructor. S–U or letter grades. Offered alternate years; next offered 2010–2011. L. C. Harrington. This course explores the impact of vector-borne disease and provides a comprehensive overview of the fields of medical and veterinary entomology. Undergraduate and graduate students from entomology as well as other disciplines including pre-medical and veterinary students are encouraged to enroll.]

[ENTOM 3521 Lab in Medical and Veterinary Entomology

Fall. 1 credit. Prerequisites: ENTOM 3520 concurrently or have taken another medical/veterinary entomology course. S–U or letter grades. Offered alternate years; next offered 2010–2011. L. C. Harrington.

The laboratory compliments the lecture course ENTOM 3520. Includes field trips, collection and identification and arthropods of medical/veterinary importance, and hands-on experience with modern laboratory research methods.]

ENTOM 3690 Chemical Ecology (also BIOEE/BIONB 3690)

Spring. 3 credits. Prerequisites: one semester of introductory biology for majors or nonmajors and one semester of introductory chemistry for majors or nonmajors or equivalents, or permission of instructor. S–U or letter grades. Lec. A. Agrawal, G. Jander, A. Kessler, and J. Thaler.

For description, see BIOEE 3690.

ENTOM 4100–4101 Malaria Interventions in Ghana

4100, fall; 4101, spring. 2 credits each semester. S–U grades only. R grade given at end of fall semester and final grade at end of spring semester. L. C. Harrington. This service learning class will educate students about malaria, Ghanaian culture, and general public health intervention strategies. During the fall semester, students will hear from a variety of speakers and will read and discuss key papers. Students in the class will travel to Ghana over winter break and create a malaria needs indicator to evaluate intervention strategies in partnership with the Ghana Health and Education Initiative. After returning from the service trip, students will evaluate their survey and intervention plan.

ENTOM 4200 Grape Pest Management (also PLPA/VIEN 4200)

ENTOM 4400 Phylogenetic Systematics (also BIOPL 4400)

ENTOM 4440 Integrated Pest Management (also CSS 4440)
Fall. 4 credits. Prerequisite: introductory biology or permission of instructor. S–U or letter grades. Lec. J. E. Losey and A. DiTommaso. Lectures integrate the principles of pest control, ecology, and economics in the management of pests across multiple systems. Labs consist of exercises to reinforce concepts presented in lecture and demonstrate pest monitoring techniques and the application of computer technology to management problems.

[ENTOM 4550 Insect Ecology (also BIOEE 4550)

Fall. 4 credits. Recommended: ENTOM 2120 or BIOEE 2610 or permission of instructor. S–U or letter grades. Offered alternate years; next offered 2010–2011. J. S. Thaler. Focuses on individual and population aspects of insect ecology as well as some topics in community and ecosystem ecology. Laboratory includes indoor and outdoor field trips illustrating the major concepts in insect ecology as well as experimental techniques.]

[ENTOM 4630 Invertebrate Pathology

Fall. 4 credits. Prerequisites: one year introductory biology. S–U or letter grades. Lec, lab. Offered alternate years; next offered 2010–2011. A. E. Hajek. Lecture and lab cover pathology and ecology of infectious diseases of invertebrates.]

[ENTOM 4700 Ecological Genetics (also BIOEE 4800)

Spring. 4 credits. Prerequisite: BIOEE 2780. Recommended: introductory course in genetics and/or statistics. S–U or letter grades. Offered alternate years; next offered 2010–2011. B. P. Lazzaro. Focuses on the application of population genetic concepts in ecological or applied contexts. Emphasizes measuring adaptation in natural populations, detecting the effects of population demography, and determining the genetic basis of quantitative traits.]

[ENTOM 4830 Insect Physiology

Spring. 4 credits. Prerequisite: ENTOM 2120 or permission of instructor. Lec, lab. Offered alternate years; next offered 2010–2011. C. Gilbert and A. Douglas. Introduction to the often unique ways in which insects have met their basic needs. Examines each organ system with emphasis

on basic principles and specific examples. Also introduces students to some common methods used in physiological research and to the critical reading of scientific literature.]

[ENTOM 4900 Toxicology of Insecticides (also TOX 4900)

Spring. 3 credits. Prerequisite: general chemistry course. S–U or letter grades. Lec. Offered alternate years. J. G. Scott. History, metabolism, and mechanism of action of genetically modified, synthetic, and naturally occurring insecticides. Discusses insecticide resistance, resistance management, and new approaches to insect control with genetically modified organisms.]

ENTOM 4940 Special Topics in Entomology

Fall or spring. 4 credits max. S–U or letter grades. Staff. The department teaches “trial” courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

ENTOM 4970 Individual Study in Entomology

Fall or spring. Credit TBA. Prerequisite: permission of instructor. Students must register using independent study form (available in 140 Roberts Hall). Staff.

ENTOM 4980 Undergraduate Teaching

Fall or spring. Credit TBA. Prerequisite: permission of instructor. Students must register using independent study form (available in 140 Roberts Hall). Staff. Undergraduate teaching assistance in an entomology course by agreement with the instructor. Participating students assist in teaching a course allied with their education and experience. Students are expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

ENTOM 4990 Undergraduate Research

Fall and spring. Credits TBA. S–U or letter grades. Staff. Prerequisite: permission of instructor. Students must register using independent study form (available in 140 Roberts Hall).

ENTOM 4991 Undergraduate Honors Research

Fall and spring. Credit TBA. For students who enroll under this number, but do not complete an Honors Thesis, course credit reverts to ENTOM 4990 Undergraduate Research. Students must register using an Independent Study Form (available in 140 Roberts Hall). Staff. This course is intended for students doing independent research that will lead to Honors with Distinction in Research.

ENTOM 6340 Special Topics in Systematic Entomology

Fall or spring; on demand. 2–4 credits. Prerequisite: permission of instructor. Staff. Lectures on the classification, evolution, and bionomics of selected taxa, with accompanying laboratory studies on identification and comparative morphology. Collections sometimes required.

[ENTOM 6550 Nomenclature Seminar]
Spring. 1 credit. S-U or letter grades. Lec. Offered alternate years; next offered 2010-2011. J. K. Liebherr.

This seminar will expose you to the rules of zoological nomenclature supported by the International Trust for Zoological Nomenclature.]

[ENTOM 6620 Insect Behavior Seminar]
Spring. 2 credits. Prerequisite: permission of instructor or ENTOM 2120 and BIONB 2210 or equivalents. S-U or letter grades. Offered alternate years; next offered 2010-2011. C. Gilbert.]

[ENTOM 6700 Seminar on Biological Control]
Fall. 1 credit. Prerequisite: ENTOM 2770, 4400, or 4630 or permission of instructor. S-U or letter grades. Offered alternate years; next offered 2010-2011. A. E. Hajek. Seminar series covering topics in biological control chosen by participating students and faculty.]

[ENTOM 6850 Seminar in Insect Physiology]
Spring. 1 credit. Prerequisite: permission of instructor. S-U or letter grades. Offered alternate years; next offered 2010-2011. C. Gilbert.]

ENTOM 6900 Seminar in Ecology and Evolution of Infectious Diseases
Fall and spring. 1 credit. B. Lazzaro and A. Hajek.
Graduate-level discussion of the ecology, epidemiology, genetics, and evolution of infectious disease in animal and plant systems. Weekly discussion of research papers published in the primary scientific literature. Participation in discussion and presentation of at least one paper required for course credit.

ENTOM 7070 Individual Study for Graduate Students
Fall or spring. Credit TBA. Prerequisite: permission of instructor. Not for thesis research. Staff.

ENTOM 7090 Teaching Entomology
Credit TBA. Staff.
Teaching entomology or for extension training.

ENTOM 7670 Current Topics in Entomology
Fall and spring. 1 or 2 credits. Requirement for first- and second-year entomology graduate students. S-U grades only. Staff.
This course provides first- and second-year graduate students with an overview of the field of entomology. The course format changes from year to year but generally involves attendance at the weekly entomology seminar as well as a one-hour meeting TBA with faculty from the department or with visiting speakers. Additional readings may be required. Graduate students in entomology are required to attend the class for a total of two semesters (ideally in the first year of their graduate program). The 2-credit option is for students attending the Jugatae seminar and a one-hour meeting following the seminar. The 1-credit option is for attendance at the seminar only.

ENTOM 8900 Master's-Level Thesis Research
Fall and spring. 15 credits per semester if taking no classes; if taking other courses, use ENTOM 8900 to bring yourself up to a total of 15 credits. Prerequisite: permission of instructor. S-U or letter grades. Staff. Research at the master's level.

ENTOM 9900 Doctoral-Level Thesis Research
Fall and spring. 15 credits per semester if taking no classes; if taking other courses, use ENTOM 9900 to bring yourself up to a total of 15 credits. Prerequisite: permission of instructor. S-U or letter grades. Staff. Research at the doctoral level.

Jugatae Seminar
Fall and spring.
Seminar conducted by Jugatae, the entomology club of Cornell University, to discuss topics of interest to its members and guests. All interested undergraduate and graduate students are encouraged to attend.

ENVIRONMENTAL TOXICOLOGY

B. A. Ahner, A. J. Baemumner, K. W. Beyenbach, S. E. Bloom, K. J. Boor, P. R. Bowser, D. L. Brown, J. W. Casey, E. Cooch, R. Davison, R. R. Dietert, R. A. Durst, J. W. Gillett, A. G. Hay, A. Hedge, J. H. Hotchkiss, L. V. Kochian, W. L. Kraus, A. T. Lemley, L. W. Lion, R. H. Liu, E. L. Madsen, M. B. McBride, C. McCormick, A. Nikitin, B. U. Pauli, R. Richardson, M. Roberson, E. Rodriguez, J. G. Scott, M. L. Shuler, S. M. Snedeker, D. A. Soderlund, J. R. Stedinger, B. J. Strupp, D. Tumbar, O. K. Vatamaniuk, D. A. Weinstein, R. S. Weiss, D. B. Wilson, A. Yen

There is both breadth and depth in many facets of environmental toxicology and related disciplines. The program offers a combination of research and didactic training that is designed to prepare students for solving the problems of modern toxicology. The graduate student may choose from three degree options: M.S., M.S./Ph.D., or Ph.D. Concentrations include cellular and molecular toxicology; nutritional and food toxicology; ecotoxicology and environmental chemistry; and risk assessment, management, and public policy. Research by the faculty associated with the program focuses on the interactions of drugs, pesticides, and other potentially hazardous environmental agents with a wide variety of living organisms (including humans) as well as the ecosystems with which these organisms are associated. General information is available through the Environmental Toxicology office in 116 Stocking Hall, or at toxicology.cornell.edu.

[TOX 3070 Pesticides and the Environment (also ENTOM 3070)]
Fall. 2 credits. Prerequisites: BIOG 1101-1102 or equivalent. Offered alternate years; next offered 2010-2011. J. G. Scott. For description, see ENTOM 3070.]

TOX 4370 Eukaryotic Cell Proliferation (also BIOBM 4370)
Spring. Variable credit; students may take lec for 2 credits, or lec and disc for 3 credits. Limited to 20 students per disc; priority given to graduate students. Prerequisite: BIOG 1101-1102 or 1105-1106 and BIOBM 3300 or 3310/3320. Recommended: BIOGD 2810 and BIOBM 4320. S. Lee.
For description see BIOBM 4370.

TOX 4900 Insect Toxicology and Insecticidal Chemistry (also ENTOM 4900)
Spring. 3 credits. Prerequisite: general chemistry course. Offered alternate years. J. G. Scott.
For description, see ENTOM 4900.

TOX 5970 Risk Analysis and Management (also CEE 5970)
Spring. 3 credits. Prerequisite: introduction to probability and statistics course (e.g., CEE 3040, ENGRD 2700, ILRST 2100, BTRY 2610 or AEM 2100); two semesters of calculus. Prerequisite: senior or graduate standing or permission of instructor. J. R. Stedinger.
For description, see CEE 5970.

[TOX 6100 Introduction to Chemical and Environmental Toxicology (also BIOMI 6100)]
Fall. 3 credits. Prerequisite: graduate standing in field or permission of instructor. Offered alternate years; next offered 2010-2011. A. G. Hay.
For description, see BIOMI 6100.]

[TOX 6110 Molecular Toxicology (also NS 6110)]
Spring. 3 credits. Prerequisites: TOX 6100 or permission of instructors. Offered alternate years; next offered 2010-2011. S. Bloom, R. Dietert, D. Muscarella, and B. Strupp.
For description, see NS 6110.]

TOX 6990 Environmental Toxicology Journal Club (also BIOMI 6990)
Spring only. 1 credit. Requirement for env. tox. students until post-A exam. A. G. Hay.
For description, see BIOMI 6990.

TOX 7010 Mouse Pathology and Transgenesis (also VTBS 7010)
Fall, meets during second half of fall semester and relies on background information from NS/BIOGD 4900. Manipulating the Mouse Genome, which meets during first half. Students interested in both courses must register for them separately. 1 credit. Prerequisites: permission of instructor. Highly recommended: NS/BIOGD 4900 and basic course in histology (BIOAP 4130 or equivalent). A. Niktin.
For description, see VTBS 7010.

TOX 7020 Seminar in Toxicology (also NS 7020)
Fall or spring. 1 credit.
For description, see NS 7020.

TOX 7130 Cell Cycle Analysis (also VTBS 7130)
Spring. 1 credit. S-U grades only. Offered alternate years. A. Yen.
For description, see VTBS 7130.

TOX 8900 Master's Thesis and Research

Fall/spring. Credit TBA. Prerequisite: permission of chair of graduate committee and instructor.

TOX 9900 Doctoral Thesis and Research

Fall/spring. Credit TBA. Prerequisite: permission of chair of graduate committee and instructor.

Related Course in Another Department**FDSC 6210 Food Lipids****FOOD SCIENCE**

K. J. Boor, chair (114 Stocking Hall, 255-7912); T. E. Acree, K. J. Arnink, D. M. Barbano, C. A. Batt, J. W. Brady, R. B. Gravani, J. H. Hotchkiss, H. T. Lawless, C. Y. Lee, R. H. Liu, D. D. Miller, R. de Mira Orduña, C. I. Moraru, S. J. Mulvaney, A. Orta-Ramirez, J. M. Regenstein, S. S. H. Rizvi, G. Sacks, K. J. Siebert, M. Wiedmann

FDSC 1101 Science and Technology of Foods

Fall. 1 credit. S–U grades only.

J. H. Hotchkiss and staff.

Explores the application of science and technology to foods. Lectures elucidate the role of engineering, biotechnology, chemistry, biochemistry, nutrition, toxicology, and microbiology in supplying the world with safe and nutritious food. An overview of food science as a discipline and career choice is given. A laboratory exercise in food development will be undertaken.

FDSC 1102 Leadership and Career Skills in Food Science

Spring. 2 credits. Prerequisite: FDSC 1101; limited to freshman Food Science majors.

Letter grades only. R. Gravani and J. Hotchkiss.

This course will provide students with opportunities to learn more about their personality type and apply this information to leadership and team building skills, diversity and ethics issues, as well as career skills in the field of food science. Topics and concepts addressed in the course will be reinforced through presentations, interactive exercises and activities, case studies, and networking with food science alumni. Students will be required to participate in a project using the Food Science Alumni Career Link network.

FDSC 1104 Introduction to Wines and Vines (also HORT/VIEN 1104)

Spring. 3 credits. Prerequisite: students must be 21 years of age, or taking this course to fulfill requirements for their degree program. Letter grades only.

K. Arnink and I. Merwin.

Introduction to grape cultivation, wine fermentation and composition, and wine sensory evaluation. Topics include history and culture of wines, viticultural regions, vineyard and winery practices, wine chemistry and microbiology, and wine flavor development and perception. Wines are used to illustrate the components and processes that determine wine quality.

FDSC 1105 Lab/Field Practice in Wines and Vines (also HORT/VIEN 1105)

Spring. 1 credit. Limited to 25 students; preference given to students in CALS enology/viticulture or Hotel School food and beverage programs. Prerequisites: students must be 21 years of age or taking course to fulfill requirements for their degree program; concurrent or previous enrollment in HORT/FDSC/VIEN 1104 and permission of instructor. Letter grades only. K. Arnink and I. Merwin.

Hands-on laboratory work, wine sensory and chemical analysis, and practical experience in viticulture and wine-making.

FDSC 1500 Food Choices and Issues

Spring. 2 credits. S–U or letter grades.

R. B. Gravani and D. D. Miller.

The goal of this course is to help students develop improved strategies for making healthier food choices. Concepts and principles that form the bases for current dietary guidelines and food safety regulations are discussed. Topics include the U.S. food system, relationships between diet and health, food processing, food safety, and selected contemporary issues relating to nutrition, food quality, and safety. Students conduct nutritional analyses of their diets using a computer software program.

FDSC 2000 Introduction to Physicochemical and Biological Aspects of Food (also NS 3450)

Fall. 3 credits. Prerequisite: college-level courses in chemistry and biology. Letter grades only. Two evening prelims are given. J. H. Hotchkiss and R. S. Parker.

Comprehensive introduction to the physical, chemical, and nutritional properties of foods and to the principles and practice of food science and technology. Topics include chemistry and functionality of commodities and ingredients, chemical and physical phenomena that affect food quality, techniques of processing and preservation, microbiology and fermentation, food safety, and regulation.

FDSC 2100 Food Analysis

Spring. 3 credits. Limited to 24 students. Prerequisite: CHEM 2080 or equivalent.

Lec, lab. R. H. Liu and A. Orta-Ramirez.

Introduces basic analytical techniques for food analysis and other biological analysis. Emphasizes fundamental principles of analytical chemistry, basic laboratory techniques, and modern instrumental methods. Discusses gravimetric, volumetric, and spectrophotometric methods, gas chromatography (GC), high-performance liquid chromatography (HPLC), infrared spectra (IR), and atomic absorption spectrometry.

FDSC 2300 Chef's Chemistry

Spring. 1 credit. S–U or letter grades.

J. Regenstein.

Do you understand scientifically what takes place when you cook food? Learn the science behind some of your favorite foods and foods from around the world. Working with chefs from Cornell Dining, food scientist faculty members will explain the underlying principles of the foods that are prepared in the class. The final EXAM (!) will be an Iron Chef cooking contest.

FDSC 2400 Wines and Grapes: Composition Analysis (also VIEN 2400)

Fall. 2 credits. Prerequisite: one semester of chemistry. Preference given to Enology and Viticulture and Food Science majors. Letter grades only. G. Sacks.

This course will investigate the composition of grapes and wine and the most common analytical tools used in their evaluation. Both the theoretical and practical aspects of grape and wine analyses will be considered.

FDSC 2500 Kosher and Halal Food Regulations

Spring. 2 credits. Prerequisite: at least sophomore standing. S–U or letter grades. J. M. Regenstein.

Comprehensive introduction to kosher and halal foods in the American food industry with some coverage of home practices. Examines the kosher food laws, their origin, and their application in modern food processing. Describes the nature of the kosher supervision industry in America. Also examines Halal laws and explores the interactions between the two communities. Reviews current food-related issues in both communities, including recent court decisions. May also consider some aspects of ethnic foods.

FDSC 2900 Meat Science (also ANSC 2900)

Fall. 2 credits. Letter grades only.

D. E. Shaw.

For description, see ANSC 2900.

FDSC 3210 Food Engineering Principles

Fall. 3 credits. Prerequisites: FDSC 2000 and introductory physics. Letter grades only. S. S. H. Rizvi.

Introduces the engineering principles underlying food processes and equipment. Topics include thermodynamics, mass and energy balance, fluid mechanics, heat and mass transport, refrigeration, and psychrometrics.

FDSC 3400 Microbiology and Technology of Winemaking (also VIEN 3400)

Fall. 3 credits. Limited to 30 students. Prerequisite: introductory microbiology or permission of instructor. Priority given to enology or viticulture students for whom lab is required. Letter grades only. K. Arnink.

This course provides a systematic overview of the microbiological technological and organizational fundamentals of winemaking considering differences among winemaking regions.

FDSC 3410 Microbiology and Technology of Winemaking Lab (also VIEN 3410)

Fall. 1 credit. Limited to 20 students; preference given to students in enology and viticulture programs in Food Science and Plant Science (Horticulture). Prerequisite: permission of instructor. Letter grades only. K. Arnink.

Laboratory practice in winemaking microbiology and technology. Students will produce grape wines from several grape varieties and according to different vinification protocols. The laboratory includes introductory lectures, grape handling, and vinification practices as well as chemical and sensorial grape must and wine analysis.

FDSC 3510 Milk Quality

Fall. 1 credit. Prerequisite: ANSC 2500 or equivalent or permission of instructor.

Letter grades only. M. Wiedmann.

Focuses on the effects of on-farm and animal husbandry practices on milk and dairy food quality and safety. Significant parts of class focus on discussion and critical analysis of the assigned reading materials, questions, and hot topics.

FDSC 3940 Applied and Food Microbiology (also BIOMI 3940)

Fall. 3 credits. Prerequisites: BIOMI 2900-2910. C. A. Batt.

Microorganisms play a central role in a variety of food, agricultural, and environmental processes. This course presents a comprehensive survey of the roles that microorganisms play in industrial/biotechnological processes as well as their importance in the safety and production of foods. A focus on the impact of genomics and the emerging understanding of the microbiome provides an underlying foundation for the course. A 2-credit core section on food microbiology is complemented by a 1-credit section on industrial/biotechnological applications.

FDSC 3950 Food Microbiology Laboratory

Fall. 3 credits. Prerequisite: BIOMI 2910 or equivalent. Letter grades only. A. Orta-Ramirez.

Work includes study of the physiological characteristics of representative food microorganisms, practice in using general and rapid methods for microbiological testing and control of food products, and practice in the application of a systematic approach to controlling the safety of foods, or addressing a food safety issue.

[FDSC 3960 Food Safety Assurance]**FDSC 4000 Current Topics in Food Science and Technology**

Spring. 1 credit. S-U grades only.

S. J. Mulvaney and staff.

Discussion of current topics in food science. Topics vary and are chosen from scientific literature and popular press.

[FDSC 4010 Concepts of Product Development]**FDSC 4020 Agriculture in Developing Nations I (also IARD 4020)**

Fall. 2 credits. K. V. Raman and W. R. Coffman.

For description, see IARD 4020.

[FDSC 4050 Managing Food Waste Without Trashing the Environment]**FDSC 4060 Dairy and Food Fermentations**

Fall. 2 credits. Prerequisite: BIOMI 2900. Letter grades only. M. Wiedmann.

Lecture course covering the basic principles of fermentation, the microbiology of food fermentations (including the physiology and genetics of fermentative microorganisms), starter cultures and their preparations and applications, as well as specific examples of food fermentations. Selected textbook readings are supplemented with papers from peer-reviewed journals. Significant parts of class focus on discussion and critical analysis of the assigned reading materials.

FDSC 4100 Sensory Evaluation of Food

Fall. 2-3 credits; 1 lab credit. Lec and lab required for undergraduate food science majors. Prerequisite: statistics course.

Letter grades only. H. T. Lawless.

Topics include the sensory evaluation methods used to test the flavor, appearance, and texture of foods by quantitative description and simple difference testing; consumer testing for product acceptability; sensory tests in quality control; strategic product research; and product development. Presents the psychological principles in sensory testing and statistical methods for sensory data analysis. The lab provides first-hand experience in organizing and conducting sensory tests and an introduction to online data collection and analysis.

FDSC 4150 Principles of Food Packaging

Spring. 3 credits. Letter grades only.

Offered alternate years. J. H. Hotchkiss.

Discusses the chemical and physical properties and manufacture of the basic materials used to construct packaging. Presents the influence of packaging on shelf life. Emphasizes newer packaging technologies and materials. Briefly presents economics, design, and regulation of food packaging.

FDSC 4170 Food Chemistry I

Spring. 3 credits. Prerequisites: CHEM 1570 or BIOBM 3300 or 3310. S-U or letter grades. J. W. Brady.

Covers the chemistry of foods and food ingredients. Discusses the chemical and physical properties of water, proteins, lipids, carbohydrates, and other food components and additives in the context of their interactions and functional roles in foods.

FDSC 4180 Food Chemistry II

Fall. 3 credits. Prerequisite: FDSC 4170.

S-U or letter grades. C. Y. Lee,

C. I. Moraru, and J. M. Regenstein.

Discusses the chemical composition of several food groups (meats, fruits, vegetables, and dairy) and describes the chemical reactions and changes that take place during processing and storage, as well their effects on the quality and nutritional characteristics of these foods.

FDSC 4190 Food Chemistry Laboratory

Fall. 2 credits. Prerequisites: BIOBM 3300 or 3310 or CHEM 1570 or equivalent.

Corequisite: FDSC 4170. D. D. Miller and A. Orta-Ramirez.

Deals with the chemical properties of food components and changes they undergo in processing and storage. Stresses relationships between the chemical composition of foods and functional, nutritional, and sensory properties. Introduces lab techniques commonly used in food research. Requires a lab research project that involves writing a research proposal for the project, conducting laboratory research to test hypotheses described in the proposal, analyzing the data, and writing a paper following the format used by the *Journal of Food Science*.

[FDSC 4220 Functional Foods and Nutraceuticals]

Spring. 2 credits. Prerequisites: Basic biochemistry course or permission of instructor. Letter grades only. Offered alternate years; next offered 2010-2011. R. H. Liu.

Covers functional foods and nutraceuticals, bioactive compounds, antioxidants and dietary supplements, micronutrient fortification, botanicals, and herbs in disease prevention and health promotion. Emphasizes the mechanisms of action and scientific evidence of efficacy. Biomarkers, safety and efficacy testing, and regulations for functional foods and nutraceuticals will be discussed.]

FDSC 4230 Physical Principles of Food Preservation and Manufacturing

Fall. 3 credits. Prerequisite: FDSC 3210.

Letter grades only. Lec, disc.

S. J. Mulvaney.

Emphasizes the fundamental principles that underlie much of food preservation and manufacturing. Uses a systems analysis approach to make connections between the chemical and physical changes that occur in food processing and their impact on food quality. Topics include materials properties of foods, heat processing, freezing, concentration, and drying. Selected products serve as case studies for more complex manufactured foods.

FDSC 4250 Unit Operations and Dairy Foods Processing

Spring. 3 credits. Prerequisites: FDSC 3210, 3940, 4170, 4180, and 4230 or permission of instructor. Letter grades only. Lec, lab. C. I. Moraru.

Combined lecture-laboratory course focusing on principles and practices fundamental to modern dairy foods processing. Structured in two parts. The first part deals with the main unit operations used in dairy processing (i.e., pasteurization, sterilization, centrifugal separation, homogenization, membrane separation, concentration, and drying) and the second part focuses on the science and technology that underpins the manufacture of main classes of dairy products (i.e., fluid milk, milk powder, ice cream, butter, and cheese). Laboratories are conducted in a food processing pilot plant facility, which allows students to gain hands-on experience in operating pilot plant equipment and the manufacture of safe, high-quality dairy products. One field trip to operating dairy plants in the area is scheduled during the semester.

FDSC 4300 Understanding Wine and Beer (also VIEN 4300)

Spring. 3 credits. Prerequisites:

introductory biology and chemistry or permission of instructor; age 21 by first day of class (Jan. 25, 2010). S-U or letter grades. T. E. Acree, K. J. Siebert, G. L. Sacks, and R. Mira de Orduña.

Introduction to wine and beer appreciation through the study of fermentation biology, product composition, and sensory perception. Uses samples of wines and beers to illustrate the sensory properties, microbiological processes, and chemical components that determine quality. Students learn to recognize the major features of wine and beer that determine sensory quality and know the processes that produced them. Topics include the psychology and chemistry of bouquet, taste, and aroma; the microbiology of fermentation and spoilage; the sensory properties of wines from different grape varieties, viticultural practices, and wine-making techniques; and the effects of brewing raw materials and processing procedures on beer quality.

FDSC 4400 Wine and Grape Flavor Development (also VIEN 4400)

Spring. 3 credits. Limited to 30 students; preference given to students in the enology or viticulture program. Prerequisites: at least one semester of general chemistry and one semester of organic chemistry required. Prior coursework in or knowledge of viticulture and enology recommended. FDSC 1104 and CHEM 2570. Letter grades only. G. Sacks.

This course will use a (bio)-chemical perspective to investigate viticulture and enological factors that impact flavor and other quality attributes (mouthfeel, color, stability) of wine and wine grapes.

FDSC 4500 Fundamentals of Food Law

Spring. 2 credits. Letter grades only.

Offered alternate years. J. M. Regenstein. Introduction to the complex array of federal and state statutes and regulations that control the processing, packaging, labeling, and distribution of food, including aspects of safety and nutritive value. Emphasizes the Food and Drug Administration and U.S. Department of Agriculture regulations but also refers to other regulatory agencies. Emphasizes how a food or agricultural professional interacts with the U.S. legal system during legislative action, regulatory rule making, and with respect to compliance.

[FDSC 4560 Advanced Concepts in Sensory Evaluation]**FDSC 4666 U.S. Food Industry and Food Science Research**

Summer. 1 credit. Prerequisite: enrollment in Food Science summer scholars program or M.P.S. in Food Science and Technology. S-U grades only. M. Wiedmann.

This course will introduce students to the U.S. food industry and food science research. Students will participate in weekly meetings to cover topics such as food science research methods, ethics in food science and research; field trips to food processing plants and R&D facilities, and panel discussions on food science careers in the United States. Students will be required to keep journals with weekly entries that reflect critical thinking on the challenges and opportunities in the discipline of food science.

FDSC 4800 Global Seminar: Building Sustainable Environments and Secure Food Systems for a Modern World (also NTRES/IARD 4800)

Spring. 3 credits. Prerequisite: junior, senior, or graduate standing. J. Lassoie and D. Miller.

For description, see NTRES 4800.

FDSC 4910 Viticulture and Enology Research Practices (also VIEN 4910)

Fall. 3 credits. Prerequisite: VIEN/FDSC/HORT 1105 or permission of instructor. Letter grades only. K. Arnink.

Collaborative wine research project for students in the Viticulture and Enology major. Original research experience, including critical evaluation of literature, experimental protocols and analytical procedures, data collection and evaluation, and scientific research writing. Emphasis on practical winemaking and laboratory methods, with sufficient lecture and discussion time to support student learning of relevant scientific concepts.

FDSC 4940 Special Topics in Food Science

Fall or spring. 4 credits max. S-U or letter grades. Staff.

The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

FDSC 4960 Undergraduate Internship in Food Science

Fall or spring. 1-6 credits. Prerequisite: permission of instructor. Students must submit a CALS independent study, research, teaching, or internship form signed by faculty member who will supervise study and assign credits and grade. S-U grades only. Staff.

On-the-job learning experience under the supervision of professionals in a cooperating organization. A learning contract is written between the faculty supervisor and students, stating the conditions of the work assignment, supervision, and reporting. All 4960 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

FDSC 4970 Individual Study in Food Science

Fall or spring. 3 credits max. Prerequisite: permission of instructor. Students must register using independent study form (available in 140 Roberts Hall). S-U or letter grades. Staff.

May include individual tutorial study, a special topic selected by a professor or a group of students, or selected lectures of a course already offered. Since topics vary, the course may be repeated for credit.

FDSC 4980 Undergraduate Teaching Experience

Fall or spring. 3 credits max. Prerequisite: permission of instructor. Students must register using independent study form (available in 140 Roberts Hall). S-U grades only. Staff.

Students assist in teaching a course appropriate to their previous training and experience. Students meet with a discussion or laboratory section and regularly discuss objectives with the course instructor.

FDSC 4990 Undergraduate Research in Food Science

Fall or spring. 4 credits max; may be repeated for credit. S-U or letter grades. Students must register using independent study form (available in 140 Roberts Hall). Staff.

Students conduct original research directed by a food science faculty member.

FDSC 4991 Food Science Honors Research

Fall. 1 to 4 credits, variable. Prerequisite: enrollment in Food Science research honors program. Students must be eligible for Latin honors and complete honors program application by third week of fall semester, senior year. S-U or letter grades. Staff.

Intended for students pursuing the research honors program in Food Science.

FDSC 4992 Food Science Honors Research

Spring. 1 to 4 credits, variable.

Prerequisite: enrollment in Food Science research honors program. Students must be eligible for Latin honors and complete honors program application by third week of fall semester, senior year. S-U or letter grades. Staff.

Intended for students pursuing the research honors program in Food Science.

FDSC 5000 Master of Professional Studies (Agriculture) Project

Fall, spring, summer. 1-6 credits. Requirement for M.P.S. students in graduate field of Food Science and Technology. S-U or letter grades. Staff. Problem solving project involving analysis and/or active research to the field of Food Science and Technology.

FDSC 5200 Advanced Food Processing and Engineering

Summer. 2 credits. Prerequisites: M.P.S. standing or permission of instructor. Letter grades only. S. Rizvi and S. Mulvaney.

This course is intended primarily for M.P.S. students in the field of Food Science and Technology enrolled in the dual Cornell-TNAU M.P.S. degree program. An intensive overview of the principles of food polymer science and rheology and analysis of current and emerging processes for food manufacturing.

FDSC 5990 Research for Lausanne Exchange Students

Fall/spring. 10 credits max. Prerequisite: permission of instructor. S-U or letter grades. Staff.

Undergraduate senior thesis research for Lausanne exchange students only. Students conduct original research directed by a food science faculty member, then write and present a final report to the faculties of both Cornell University and the University of Lausanne.

FDSC 6000 Seminar in Food Science

Fall and spring. 1 credit. Requirement for all graduate students in field of food science and technology; highly recommended for graduate students minoring in food science and technology. S-U grades only. Staff.

Weekly seminar series on contemporary topics and issues in the field of food science and technology. Representatives from academia, industry, and government provide presentations on a wide variety of topics. Graduate students in the field of food science and technology may use the forum to present their required thesis research seminar.

FDSC 6020 Agriculture in Developing Nations II (also IARD 6020)

Spring, field trip to Asia during Jan. intersession. 3 credits. Prerequisites: IARD 4020 and (or) permission of instructors. Cost of field-study trip is \$4,000 (including airfare, local transportation, and lodging). Some merit and need-based financial aid may be available. K. V. Raman and W. R. Coffman.

For description, see IARD 6020.

FDSC 6040 Chemistry of Dairy Products]**FDSC 6070 Advanced Food Microbiology**

Spring, 2 credits. Prerequisites: BIOMI 2900, FDSC 3940. Letter grades only. Offered alternate years. M. Wiedmann.

Explores advanced topics in food microbiology. Places major emphasis on critical evaluation of current literature and on microbiological concepts that affect food microbiology. Specific areas covered include microbial ecology of foods, rapid detection and typing methods for foodborne pathogens, microbial modeling, pathogenesis of foodborne diseases, and food applications of genetic engineering. Some guest lectures may be arranged to provide an introduction to other advanced food microbiology topics (e.g., risk assessment).

FDSC 6080 Chemometric Methods in Food Science]**FDSC 6160 Flavors—Analysis and Applications**

Spring, 2 credits. S–U or letter grades. Lec, disc. Offered alternate years. H. T. Lawless and T. E. Acree.

Advanced course in sensory and instrumental analysis of flavors, flavor chemistry, and flavor applications in foods for food scientists and those in related fields concerned with human food perception and consumption. Surveys taste, aroma and volatile flavors, and trigeminal stimuli from the perspectives of chemical structures, methods of analysis, uses and interactions in food systems. Also discusses recent advances in the physiology of taste and smell.

FDSC 6210 Food Lipids

Spring, 2 credits. Prerequisite: basic biochemistry course. Letter grades only. Offered alternate years. R. H. Liu.

Describes the physical, chemical, biochemical, and functional properties of lipids. Emphasizes lipid oxidation, lipids and human health, and functional foods associated with lipids.

FDSC 6220 Functional Foods and Nutraceuticals

Spring, 2 credits. Prerequisites: basic biochemistry course or permission of instructor. Letter grades only. Offered alternate years; next offered 2010–2011. R. H. Liu.

Covers functional foods and nutraceuticals, bioactive compounds, antioxidants and dietary supplements, micronutrient fortification, botanicals and herbs in disease prevention and health promotion. Emphasizes the mechanisms of action and scientific evidence of efficacy. Biomarkers, safety and efficacy testing, and regulations for functional foods and nutraceuticals will be discussed.]

FDSC 6640 Food Polymer Science: Principles and Applications

Spring, 2 credits. Prerequisites: introductory chemistry and physics. Offered alternate years. S. J. Mulvaney.

Integrates polymer science, chemistry, and materials science principles as the basis for characterization of the physical properties of biopolymer materials of interest to the food industry. Emphasizes unique aspects of food materials, e.g., plasticization by water, physical gelation, transient networks, and effects of thermal treatments on material properties. Problems and case studies based

on proteins, starches, gelatin, and other hydrocolloids relevant to food systems.

FDSC 6650 Food and Bioprocessing Systems]**FDSC 6940 Special Topics in Food Science**

Fall or spring, 4 credits max. S–U or letter grades. Staff.

The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

FDSC 6950 Current Readings in Food Science

Fall and spring, 1 credit; may be taken multiple times. Graduate students in food science strongly encouraged to enroll. Prerequisite: 3000- to 4000-level course relevant to chosen topic. S–U grades only. Staff.

Seminar series on current topics chosen by participating faculty members and students on a rotating basis. Format consists of weekly discussion groups with each participant presenting at least one oral report based on independent reading. Multiple sections focusing on different topics may be taught in any given semester. Topics include food microbiology and food safety; food chemistry; packaging; food engineering. Interested students should contact the designated instructor(s) for each semester.

FDSC 6960 Graduate Internship in Food Science

Fall or spring, 1–6 credits. Prerequisite: permission of instructor. S–U grades only. Staff.

On-the-job learning experience under the supervision of professionals in a cooperating organization. A learning contract is written between the faculty supervisor and students, stating the conditions of the work assignment, supervision, and reporting. All 6960 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

FDSC 6970 Graduate Individual Study in Food Science

Fall or spring, 1 to 3 credits. S–U or letter grades. Staff.

FDSC 6980 Graduate Teaching Experience

Fall and spring, 1 to 3 credits. S–U grades only. Staff.

Designed to give graduate students teaching experience through involvement in planning and teaching courses under the supervision of field faculty members. The experience may include leading discussion sections; preparing, assisting in, or teaching lectures and laboratories; and tutoring.

FDSC 8900 Master's-Level Thesis Research

Fall or spring. Credit TBA; max. 12. Prerequisite: master's candidates; permission of Special Committee chair. S–U grades only. Graduate faculty.

FDSC 9900 Doctoral-Level Thesis Research

Fall or spring. Credit TBA. Maximum of 12 credits. Prerequisite: doctoral students who have passed "A" exam; permission of Special Committee chair. S–U grades only. Graduate faculty.

HORTICULTURE

M. P. Pritts, chair (134A Plant Science Bldg., 255-1778); N. L. Bassuk, T. L. Bauerle, R. R. Bellinder, M. P. Bridgen, L. J. Bushway, L. Cheng, P. Cousins, L. E. Drinkwater, M. Eames-Sheavly, S. Gan, M. C. Goffinet, D. E. Halseth, A. N. Lakso, N. S. Mattson, I. A. Merwin, W. B. Miller, J. Mt. Pleasant, K. W. Mudge, C. Owens, A. M. Petrovic, D. A. Rakow, A. Rangarajan, B. I. Reisch, F. S. Rossi, J. E. Vanden Heuvel, C. B. Watkins, T. H. Whitlow, H. C. Wien, D. W. Wolfe

HORT 1101 Horticultural Science and Systems

Fall, 4 credits. I. A. Merwin.

Science and technology of horticultural plants grown for foods and beverages and ornamental, landscape, or recreational purposes. Lectures, labs, and field trips involve natural history and evolution of horticultural plants, botany and physiology, sustainable management of soil, water and plant nutrition, breeding and propagation, ecological and landscape functions, and integrated design and management of horticultural plantings and production systems.

HORT 1102 Hands-On Horticulture

Spring, 2 credits. Not for seniors or plant science majors. Nominal materials fee. M. P. Pritts.

The objective is to instill in students a lifelong appreciation for how gardening can enhance individual well-being through aesthetics, culinary experiences, and mastery of techniques. Emphasizes hands-on learning and practice of key gardening skills and techniques in the greenhouse and the field, such as landscape management, garden design, propagation, pruning, grafting, pest management, and flower arrangement. There is one Saturday field trip at the end of the semester to visit gardens in the local area.

HORT 1104 Introduction to Wines and Vines (also FDSC/VIEN 1104)

Spring, 3 credits. Letter grades only. K. J. Arnink and I. A. Merwin.

For description, see FDSC 1104.

HORT 1105 Lab/Field Practice in Wines and Vines (also FDSC/VIEN 1105)

Spring, 1 credit. K. J. Arnink and I. A. Merwin.

For description, see FDSC 1105.

HORT 1110 Collaboration, Leadership, and Career Skills in the Plant Sciences

Fall, 2 credits. Prerequisite: permission of instructors. M. P. Pritts and M. Eames-Sheavly.

For all new plant sciences students; seminar will provide opportunities to meet other students and faculty, develop collaboration, leadership, and career skills in the discipline, and to make connections with the world beyond the campus.

HORT 1160 Nature Writing

Spring. 3 credits. Letter grades only.
D. W. Wolfe.

Today more than ever we need individuals who not only enjoy or study nature, but also can write effectively about it so that others will know what they know, and feel what they feel. We will begin by reading and writing about the technique of others, from Thoreau and Whitman, to Edward Abbey and Wendell Berry, to emerging new voices in this genre. We will critique essay structure, literary creativity, and evidence of careful research and observation. Nature writing is more than a desk job, and in that spirit we will have at least two shared field trips. Students will develop their unique "voice" for expressing their views, expertise, and passion for nature by research and revision of essay topics of personal interest.

HORT 2010 The Art of Horticulture

Fall. 2–3 credits. Fee for materials: \$35.
M. Eames-Sheavly.

Experiential survey course, two distinct units: plants used in/as art; plants as a subject of art. Unit 1: sculpture methods, such as turf-works, tree sculpture, Unit 2: drawing, botanical illustration, watercolor/pastel painting. Required: attendance; critical reflection in journals; original, creative final project. Optional third credit: pursue proficiency in drawing.

HORT 2200 Practicing Sustainable Land Care

Fall. 2–3 credits; 1 additional credit for student projects by permission of instructor. Offered odd-numbered years.
L. E. Drinkwater.

Experiential course emphasizing interdisciplinary, ecosystem-based approaches to land management and food production. Covers concepts from biological and environmental sciences and includes hands-on activities in organic agriculture, agroforestry, and ecosystem restoration. Classes are held at Dilmun Hill Organic Farm and the MacDaniels Nut Grove.

HORT 2350 Plants and Human Well-Being (CA) (HA)

Spring. 3 credits. Offered even-numbered years. J. Mt. Pleasant and S. M. Skelly.

Examines the beneficial effects of plants on human cultures, communities, and individuals. Areas of focus include impacts of community gardens, green space, and farmer's markets; use of plants for pollution control, economic development, conflict resolution, and tourism; how plants benefit individuals in terms of adult cognition, K–12 education, mental health, and personal empowerment. Laboratories include field trips and exercises to allow students to analyze and evaluate plant-based initiatives in many phases of contemporary life.

HORT 2400 Exploring the Small Farm Dream

Spring. 1 credit. Prerequisite: permission of instructors. S–U grades only. J. Green and A. Rangarajan.

Explore opportunities and challenges involved in starting up and managing a small farm. Weekly presentations and discussion with innovative farmers and others. Topics include diversified farming, high-value horticulture, grass-based farming, agroforestry, dairy and livestock opportunities, community-supported agriculture, farm business planning, access to

land, marketing strategies, juggling jobs, family-farming, and more.

[HORT 2430 Taxonomy of Cultivated Plants (also BIOPL 2430)]

Fall. 4 credits. Prerequisite: one year introductory biology or written permission of instructor. May not be taken for credit after BIOPL 2480. Offered even-numbered years; next offered 2010–2011.
M. A. Luckow.

For description, see BIOPL 2430.]

HORT 2940 Introduction to Agricultural Machinery (also CSS/AGSCI 2940)

Fall. 2 credits. B. Flannigan and A. DiTommaso.

For description, see CSS 2940.

HORT 3000 Herbaceous Plant Materials

Fall. 3 credits. Cost of field trip: \$75.
W. B. Miller.

Identification, use, characteristics, and garden cultural requirements of annual and herbaceous perennial plants, especially those used in northern climates. Practical gardening experiences at selected campus locations. Field trips to nearby specialty nurseries.

[HORT 3100 Production and Marketing of Greenhouse Crops]

Spring. 4 credits. Prerequisites: HORT 1101 and any other horticulture course; junior standing preferred. Letter grades only. Cost of required three-day field trip: approx. \$130. Offered odd-numbered years; next offered 2010–2011.
W. B. Miller.

Covers basics of establishing a greenhouse operation, growing crops in optimized environments and serving niche or mass market. Discusses technology basics and production management.]

HORT 3170 Seed Science and Technology (also CSS 3170)

Fall. 3 credits. Prerequisite: BIOPL 2410 or equivalent course approved by instructor. Letter grades only. Offered odd-numbered years. A. G. Taylor, Geneva Experiment Station.

For description, see CSS 3170.

[HORT 3300 Golf and Sports Turf Management I]

Spring. 3 credits. Prerequisite: CSS 2600 or permission of instructor. Letter grades only. Offered odd-numbered years; next offered 2010–2011. F. S. Rossi and A. M. Petrovic.

Proposal, siting, specification, installation, establishment, and management of turfgrass areas. Emphasizes commercial locations including lawns, sports fields, and golf courses.]

HORT 3400 Golf and Sports Turf Management Techniques

Fall. 2 credits. Prerequisite: HORT 3300. Letter grades only. Offered odd-numbered years. F. S. Rossi.

A course designed to provide hands-on learning of essential turfgrass management skills including mower set-up, sprayer calibration, calibration mathematics, budget development, etc.

HORT 3800 Organic Food and Agriculture (also CSS/AGSCI 3800)

Fall. 3–4 credits. Prerequisite: CSS 1900, CSS 2600, HORT 1101, or permission of instructor. Staff.

For description, see CSS 3800.

HORT 3910 Woody Plant Identification and Use I

Fall. 2 credits. Limited enrollment. Prerequisite: permission of instructor. Letter grades only. N. L. Bassuk.

Module of HORT/LA 4910 covering the identification of approximately 200 woody trees, shrubs, and vines in leaf and their use in the landscape. Students desiring a more comprehensive course that covers site assessment, soil modification, design, plant specifications and landscape establishment principles and techniques should take HORT/LA 4910 or the 4910–4920 sequence.

HORT 3920 Woody Plant Identification and Use II

Spring. 2 credits. Limited enrollment. Prerequisite: permission of instructor. Letter grades only. N. L. Bassuk.

Module of HORT/LA 4920 covering the identification of approximately 160 evergreen trees and shrubs and deciduous plants using winter identification. HORT 3910 (fall module) need not be taken before taking HORT 3920 (spring module). Students also assist in the establishment of a new landscape on campus.

HORT 4000 Principles of Plant Propagation

Spring. 3 credits. Prerequisites: BIOPL 2420 and 2421 or another plant physiology course or permission of instructor.
K. W. Mudge.

Asexual (vegetative) propagation including cuttage, graftage, tissue culture, layering, and specialized vegetative reproductive structures and sexual (seed) propagation. Stresses physiological, environmental, and anatomical principles and industry applications in lecture, and hands-on skills in laboratories. Examples include both temperate and tropical horticultural, agronomic, and forestry crops.

HORT 4030 Plant Cell and Tissue Culture (also PLBR 4010)

Fall. 3 credits. Letter grades only.
E. D. Earle.

For description, see PLBR 4010.

HORT 4040 Plant Tissue Culture Laboratory (also PLBR 4011)

Fall. 1 credit. E. D. Earle.

For description, see PLBR 4011.

HORT 4200 Nursery-Crop Production

Fall. 3 credits. Prerequisite: HORT 4000 or permission of instructor. Cost of field trips: \$75. Offered odd-numbered years.
K. W. Mudge.

Principles and practices of commercial nursery crop production. Term project required. Includes field trips to commercial nurseries.

HORT 4250 Postharvest Biology of Horticultural Crops

Fall. 2 credits. Offered odd-numbered years. S. Gan.

Study of the biological processes controlling physical and chemical changes in harvested yet living horticultural crops or their parts. Discusses the theoretical principles and fundamental processes underlying these changes. Also covers strategies and practical handling requirements/conditions for storage, transportation, and quality monitoring of harvested horticultural crops.

HORT 4251 Postharvest Biology of Horticultural Crops Lab

Fall. 1 credit. Pre- or corequisite: HORT 4250. Offered odd-numbered years. S. Gan.

Laboratory exercises are intended to supplement/complement HORT 4250 lectures. Labs, taught by scientists who are experts in their respective subject areas, will involve some experimental manipulations and physiological and biochemical analysis of harvested fruits, vegetables and flowers, data analysis, and oral and written discussion of the results. Lab periods will also provide time for formal discussion of research papers and topics. May include one field trip during regularly scheduled lab.

HORT 4260 Practicum in Forest Farming as an Agroforestry System (also NTRES/CSS 4260)

Fall. 2 credits. Prerequisite: junior, senior, or graduate standing or permission of instructor. K. W. Mudge, P. Hobbs, and L. E. Buck.

Students actively take part in the restoration of a 70-year-old nut grove. The MacDaniel's Nut Grove is being developed as a multipurpose forest-farming teaching, research, and extension site. Hands-on activities include site evaluation and planning, temperate-nut harvest and variety evaluation, mushroom culture, small-fruit and fruit-tree culture, and medicinal-herb culture. Outdoor activities are integrated with selected readings via an online discussion board.

HORT 4400 Restoration Ecology

Fall. 5 credits. Prerequisite: upper-division or graduate standing and permission of instructor. Letter grades only. Lec, lab, plus several weekends. T. H. Whitlow.

Draws concepts from ecology, hydrology, soil science, and conservation biology and applies these in both principle and practice to the rapidly evolving field of restoration ecology. Through lectures, reading, and discussion, site visits to active restoration sites, and a real-world class project, students learn and practice skills needed to develop restoration plans for a variety of situations.

[HORT 4420 Berry Crops: Culture and Management

Fall. 3 credits. Offered even-numbered years; next offered 2010-2011. M. P. Pritts. Study of the evolution, breeding history, and physiology of strawberries, raspberries, blackberries, blueberries, and other small fruit crops. Frequent field trips.]

HORT 4430 Viticulture and Vineyard Management—I (also VIEN 4430)

Fall. 3 credits. Prerequisite: any two-semester college biology course. Letter grades only. J. E. Vanden Huevel and P. Cousins.

First-semester course in commercial grape production with an emphasis on the problems of production in cold climates. Students examine environmental factors favoring production and quality, soils, and the anatomical and physiological basis for vineyard management decision-making. Laboratory exercises and field trips offer hands-on experience.

HORT 4440 Viticulture and Vineyard Management—II (also VIEN 4440)

Spring. 3 credits. Pre- or corequisites: HORT 4430 or permission of instructor. Letter grades only. J. E. Vanden Huevel.

Second-semester course in commercial grape production with an emphasis on the problems of production in cold climates. Students examine the genetics of the vine and learn principles of vineyard establishment, propagation, pruning and training, and conservation. Laboratory exercises and field trips offer hands-on experience.

HORT 4444 Grapevine Biology (also VIEN 4444)

Spring. 3 credits. Prerequisite: introductory botany; BIOPL 2420 or equivalent. Letter grades only. Offered odd-numbered years. A. N. Lakso, M. C. Goffinet, B. I. Reisch, P. S. Cousins, and C. L. Owens.

Focuses on the whole-plant biology of the grapevine that underpins grape-growing. Major topics include vine structure and its organization, vegetative and reproductive development, biomass and carbon balance, water and mineral nutrition, grapevine species and taxonomy, grape scion varieties, rootstocks, breeding and genetic improvement, and genomics.

HORT 4450 Ecological Orchard Management

Spring. 3 credits. Prerequisite: introductory biology. Recommended: previous horticulture/plant science courses. S-U or letter grades. Offered even-numbered years. I. A. Merwin.

The ecology and technology of deciduous tree-fruit production. Topics include basic tree and fruit physiology; orchard renovation and design systems; nutrition, irrigation, and freeze protection practices; tree pruning and training; post-harvest fruit storage; marketing and economic spreadsheet models; monitoring and decision-making systems for integrated pest management; and efficient use of orchard equipment. Emphasizes the agroecology of perennial crop systems, with labs providing hands-on experience in orchard management.

HORT 4490 Green Signals and Triggers—The Plant Hormones (also BIOPL 4490)

Spring. 2 credits. Prerequisites: introductory biology and BIOPL 2420 or 3420 or permission of instructor. S-U or letter grades. Offered even-numbered years. P. J. Davies.

For description, see BIOPL 4490.

[HORT 4500 Principles of Vegetable Production

Fall. 3 credits. Prerequisite: HORT 1101, CSS 2600, or equivalent. Letter grades only. Two Sat. field trips; students responsible for cost of their meals. Offered even-numbered years; next offered 2010-2011. R. R. Bellinder and S. Reiners.

Commercial vegetable production from variety selection to postharvest. Topics include: crop physiology and culture, soil and pest management, stand establishment, marketing, and history of production.]

HORT 4551-4555 Mineral Nutrition of Crops and Landscape Plants (also CSS 4551-4555)

Spring. 5 modules, 1 credit each. Prerequisite: CSS 2600 and BIOPL 2420. Offered even-numbered years.

Coordinator: H. C. Wien.

Students learn the principles of mineral nutrient function in crop plants, are able to diagnose deficiencies by symptoms and tissue tests, and can devise organic and

conventional nutrient management schemes that maximize productivity and mineral nutrient quality.

HORT 4551 Crop Nutrition Principles (also CSS 4551)

Spring, weeks 1-3. 1 credit. Prerequisite: CSS 2600 and BIOPL 2420, or equivalent. Offered even-numbered years. H. C. Wien.

Required module to be taken in addition to at least two, or up to four other modules.

HORT 4552 Agronomic Crop Nutrition (also CSS 4552)

Spring, weeks 4-6. 1 credit. Prerequisite: CSS 2600 and BIOPL 2420, or equivalent. Offered even-numbered years.

J. M. Duxbury.

Must be taken with the required Crop Nutrition Principles module—HORT 4551—and at least one other module.

HORT 4553 Vegetable Crop Nutrition (also CSS 4553)

Spring, weeks 7-9. 1 credit. Prerequisite: CSS 2600 and BIOPL 2420, or equivalent. Offered even-numbered years. S. Reiners.

Must be taken with the required Crop Nutrition Principles module—HORT 4551—and at least one other module.

HORT 4554 Landscape Plant Nutrition (also CSS 4554)

Spring, weeks 10-12. 1 credit. Prerequisite: CSS 2600 and BIOPL 2420, or equivalent. Offered even-numbered years.

A. M. Petrovic.

Must be taken with the required Crop Nutrition Principles module—HORT 4551—and at least one other module.

HORT 4555 Fruit Crop Nutrition (also CSS 4555)

Spring, weeks 13-14. 1 credit. Prerequisite: CSS 2600 and BIOPL 2420, or equivalent. Offered even-numbered years. L. Cheng.

Must be taken with the required Crop Nutrition Principles module—HORT 4551—and at least one other module.

HORT 4600 Cropping Systems Ecology

Spring. 3 credits. Prerequisite: any crop production or plant ecology course or permission of instructor. Offered even-numbered years. D. W. Wolfe.

Course utilizes the basic principles of plant population biology, environmental physiology, and ecology to evaluate the management, productivity, and environmental impact of various cropping systems. Emphasis is on agricultural systems, but the role of plant-plant interactions and biodiversity in succession and productivity of natural ecosystems will also be discussed.

[HORT 4620 Physiology of Vegetables and Flowers

Spring. 4 credits. Prerequisite: BIOPL 2420 or equivalent. Offered odd-numbered years; next offered 2010-2011. H. C. Wien.

Study of the physiological principles that govern growth, development, and production of reproductive structures of vegetable crops and herbaceous ornamental plants. Hands-on greenhouse experiments.]

HORT 4660 Soil Ecology (also CSS 4660)

Spring. 4 credits, with lab. Prerequisite: one year of biology or ecology and CSS 2600 or permission of instructor.

J. E. Thies.

For description, see CSS 4660.

[HORT 4730 Ecology of Agricultural Systems (also BIOEE 4730)

Fall. 3 credits. Prerequisite: BIOEE 2610 or permission of instructor. S–U or letter grades. During first six weeks, R meetings may run later due to field trips. Offered even-numbered years; next offered 2010–2011. L. E. Drinkwater and A. G. Power. For description, see BIOEE 4730.]

HORT 4800 Plantations Lecture Series

Fall, 12 weeks, 6 lec. 1 credit. S–U grades only. Meets alternate W evenings. D. A. Rakow.

Covers a range of subjects related to the plant and natural sciences, and human-cultural themes. On non-lecture Wednesdays, the class meets to discuss content from the previous week. Students are required to write a reaction paper for each lecture.

HORT 4850 Public Garden Management

Spring. 3 credits. Prerequisites: HORT 3000; HORT 4910 or 4920. Cost of two-and-a-half-day field trip to botanical gardens and arboreta: approx. \$85. Offered even-numbered years.

D. A. Rakow.

Explores the history of public gardens, types of contemporary public gardens, and the operation of public gardens including botanical gardens and arboreta. Includes separate units on administration and business management of gardens, collections curatorship, collections design, educational programs, research, and management of landscapes and natural areas.

HORT 4900 Golf and Sports Turf Management II

Spring. 2 credits. Prerequisite: HORT 3300. Offered even-numbered years. F. S. Rossi.

Designed for students familiar with turfgrass science and a strong interest in the design, construction, and maintenance of golf courses and sports fields. This course focuses on current and emerging issues concerning the scientific, economic and environmental aspects of golf courses and sports fields.

HORT 4910 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment (also LA 4910)

Fall. 4 credits. Limited to 48 students. Prerequisite: horticulture or landscape architecture majors or permission of instructor. Preregistration required. N. L. Bassuk and P. J. Trowbridge.

Focuses on the identification, uses, and establishment of woody plants in urban and garden settings. By understanding the environmental limitations to plant growth, students can critically assess potential planting sites, select appropriate trees, shrubs, vines, and ground covers for a given site, and learn about the principles and practices of site amelioration and plant establishment. Design followed by written specifications and graphic details is produced to implement these practices. A project where students implement what they have learned by creating a new landscape serves to integrate theory, principles, and practices. No prior design experience necessary.

HORT 4920 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment (also LA 4920)

Spring. 4 credits. Limited to 48 students. Prerequisite: passing grade in HORT/LA 4910; horticulture or landscape architecture majors or permission of instructors. Preregistration required.

N. L. Bassuk and P. J. Trowbridge.

Second half of course focusing on the winter identification, uses, and establishment of woody plants in urban and garden settings. Issues of site assessment and soil remediation are emphasized in addition to soil volume calculations, drainage and surface detailing, and planting techniques. Students critically assess potential planting sites and select appropriate trees, shrubs, vines, and ground covers for a given site. Design for specific sites followed by written specifications and graphic details are produced to implement these proposals. Students implement, in a hands-on manner, site remediation and planting techniques they have learned by creating new landscapes that serve to integrate theory, principles, and practices. Together, HORT/LA 4910 and 4920 constitute an integrated course.

HORT 4940 Special Topics in Horticulture

Fall or spring. 4 credits max. S–U or letter grades. Staff.

The department teaches “trial” courses under this number. Offerings may vary by semester and will be advertised before the semester begins. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

HORT 4950 Undergraduate Seminar—Current Topics in Horticulture

Fall and spring. 1 credit; may be taken four times for 1 credit per semester. Graduate students should enroll in HORT 6000. S–U grades only. L. Cheng.

Undergraduate participation in weekly departmental seminar series.

HORT 4960 Internship in Horticulture

Fall or spring. Variable credit. Prerequisite: permission of student's advisor **in advance of participation** in internship programs. S–U or letter grades. Students must register using individual study form (available in 140 Roberts Hall) signed by faculty member who will supervise study and assign grade. All 4960 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm. Staff.

HORT 4970 Individual Study in Horticulture

Fall or spring. Variable credit. Prerequisite: permission of instructor(s). S–U or letter grades. Students must register using individual study form (available in 140 Roberts Hall). Staff.

Undergraduate individual study in horticultural sciences under the direction of one or more faculty members.

HORT 4980 Undergraduate Teaching Experience

Fall or spring. Variable credit.

Prerequisites: previous enrollment in course to be taught or equivalent, and written permission of instructor. S–U or letter grades. Students must register using individual study form (available in 140 Roberts Hall). Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and teaching horticultural sciences courses under the supervision of departmental faculty members. May include leading discussion sections; preparing, assisting in, or teaching laboratories; and tutoring.

HORT 4990 Undergraduate Research

Fall or spring. Variable credit. Prerequisite: permission of instructor. S–U or letter grades. Students must register using individual study form (available in 140 Roberts Hall.) Staff.

Undergraduate research projects in horticultural sciences.

HORT 5900 Master of Professional Studies (Agriculture) Project

Fall or spring. 1–6 credits; 6 credits max. toward M.P.S. (agriculture) degree.

Requirement for M.P.S. (agriculture) candidates in respective graduate fields of horticulture. S–U or letter grades. Staff.

Comprehensive project emphasizing the application of principles and practices to professional horticultural teaching, extension, and research programs and situations.

HORT 6000 Seminar in Horticulture

Fall and spring. 1 credit. Requirement for graduate students majoring or minoring in horticulture. Undergraduate students enroll in HORT 4950. S–U grades only. L. Cheng.

Weekly seminars consisting of graduate student research project reports, faculty research topics, as well as guest speakers from other universities and/or industry.

[HORT 6100 Extension Volunteer Development in Garden-based Learning

Fall. 2 credits. Prerequisite: course work in horticulture and related fields.

Undergraduate plant sciences students by permission of instructor. Offered even-numbered years; next offered 2010–2011. L. J. Bushway.

Extension/outreach training course for graduate entomology, pathology, and horticulture students. Learn skills to effectively develop knowledge of adult volunteers in garden-based learning programs.]

[HORT 6110 Field Experience in Extension Volunteer Development in Garden-based Learning

Spring. 1 credit. Prerequisite: HORT 6100. Offered odd-numbered years; next offered 2010–2011. L. J. Bushway.

Lead introductory horticultural science training sessions for Master Gardener Volunteers and/or other volunteer groups associated with garden-based learning outreach.]

HORT 6150 Quantitative Methods in Horticultural Research

Spring, weeks 1–7. 2 credits. Prerequisite: BTRY 6010, 6020, or permission of instructor. S–U grades only. Offered even-numbered years. D. W. Wolfe.

Provides experience in applying statistics principles to real-world agricultural research problems. Uses examples of lab, greenhouse, and field studies from the published literature. Explores other quantitative methods. Topics include approaches to controlling and analysis of variation; common block and incomplete block designs; selecting an appropriate significance level; designing on-farm experiments and demonstration plots; regression methods in relation to mechanistic models and path and principal components analysis; and plant growth analysis techniques.

[HORT 6170 Advanced Analytical Methods for Plant Systems

Spring. 2 credits. Prerequisite: one year of general chemistry, one semester of organic chemistry, plant physiology. Letter grades only. Offered odd-numbered years; next offered 2010-2011. L. Cheng.

Principles and practical applications of selected laboratory methods in the plant and environmental sciences. Emphasizes enhancement of laboratory technique and problem-solving skills.]

HORT 6180 Breeding for Pest Resistance (also PLBR 6180)

Fall. 2 credits. Prerequisites: BIOGD 2810 and PLBR 4030 or equivalents. Highly recommended: introductory plant pathology and/or entomology course. Letter grades only. Offered even-numbered years. P. D. Griffiths.

For description, see PLBR 6180.

HORT 6251 Advanced Postharvest Biology: Postharvest Physiology

Fall. 1 credit (12 lec). Offered even-numbered years. S. Gan.

Emphasizes the physiological and biochemical aspects of growth and maturation, ripening, and senescence of harvested horticulture plant parts.

HORT 6252 Advanced Postharvest Biology: Plant Senescence (also BIOPL 4836)

1 credit. (12 lec). S. Gan.

Introduces molecular, genetics, and genomics approaches in plant senescence and postharvest research.

HORT 6253 Advanced Postharvest Biology: Postharvest Technology

1 credit. (12 lec). C. B. Watkins.

Emphasizes advanced existing and emerging technology and practice for handling, monitoring, and storage of horticultural crops after harvest.

HORT 6350 Tools for Thought

Fall. 1 credit. Prerequisite: graduate standing. S-U grades only. T. H. Whitlow. Discusses readings from Kuhn, Waddington, Wilson, Lewontin, and others emphasizing application of the philosophy of science to the real-world practices of scientists.

HORT 6450 Advanced Viticultural Topics (also VIEN 6450)

Spring. 2 credits. Prerequisite: HORT 4430 or equivalent. Letter grades only. Offered even-numbered years. A. N. Lakso.

In-depth lecture/discussion of complex topics of viticulture that have important impacts on fruit composition and wine quality. These include crop load effects, canopy management, water relations, vineyard efficiency, and vineyard variability/precision viticulture.

HORT 6940 Special Topics in Horticulture

Fall or spring. 4 credits max. S-U or letter grades. Staff.

The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committees, and the same course is not offered more than twice under this number.

HORT 6970 Graduate Individual Study in Horticulture

Fall or spring. Variable credit. Prerequisite: permission of instructor(s). S-U or letter grades. Staff.

Graduate individual study in horticultural sciences under the direction of one or more faculty members.

HORT 7000 Graduate Teaching Experience

Fall or spring. Variable credit. Prerequisite: permission of instructor; graduate standing. Undergraduates should enroll in HORT 4980. S-U or letter grades. Staff.

Designed to give graduate students teaching experience through involvement in planning and teaching courses under the supervision of departmental faculty members. May include leading discussion sections; preparing, assisting in, or teaching lectures and laboratories; and tutoring.

HORT 8900 Thesis Research, Master of Science

Fall or spring. Variable credit. S-U grades only.

HORT 9900 Thesis Research, Doctor of Philosophy

Fall or spring. Variable credit. S-U grades only.

INFORMATION SCIENCE

C. Cardie, director; J. Abowd, W. Y. Arms, G. Bailey, K. Bala, J. Birnholtz, L. Blume, R. Constable, D. Cosley, D. Easley, S. Edelman, E. Friedman, S. Fussell, G. Gay, J. Gehrke, T. Gillespie, P. Ginsparg, C. Gomes, F. Guimbretiere, J. Halpern, J. Hancock, A. Hedge, L. Humphreys, D. Huttenlocher, R. Jarrow, T. Joachims, J. Kleinberg, L. Lee, A. E. Leiponen, B. Lust, M. Macy, P. Martin, T. Pinch, R. Prentice, M. Rooth, B. Selman, P. Sengers, D. Shmoys, D. Strang, E. Tardos, E. Wagner, S. Wicker, D. Williamson, C. Yuan

INFO 1300 Introductory Design and Programming for the Web (also CS 1300)

Fall. 3 credits.

For description, see INFO 1300 in CIS section.

INFO 2040 Networks (also CS 2850, ECON 2040, SOC 2090) (SBA)

Spring. 4 credits.

For description, see ECON 2040.

INFO 2140 Cognitive Psychology (also COGST/PSYCH 2140) (KCM)

Spring. 4 credits. Limited to 175 students. Prerequisite: sophomore standing.

Graduate students: see INFO 6140. For description, see PSYCH 2140.

INFO 2300 Intermediate Design and Programming for the Web (also CS 2300)

Spring. 3 credits. Prerequisite: INFO 1300 strongly recommended. Must be taken before INFO 3300.

For description, see INFO 2300 in CIS section.

[INFO 2310 Topics in Web Programming and Design]

INFO 2450 Communication and Technology (also COMM 2450) (SBA)

Fall, summer. 3 credits.

For description, see COMM 2450.

INFO 2921 Inventing an Information Society (also AMST/ECE/ENGRG 2980, HIST 2920, STS 2921)

Spring. 3 credits.

For description, see ENGRG 2980.

INFO 2950 Mathematical Methods for Information Science

Fall. 4 credits. Corequisite: MATH 2310 or equivalent.

For description, see INFO 2950 in CIS section.

INFO 3200 New Media and Society (also COMM 3200) (CA)

Spring. 3 credits.

For description, see COMM 3200.

INFO 3300 Data-Driven Web Applications (also CS 3300)

Spring. 3 credits. Prerequisite: CS 2110 and (INFO 2300 or permission of instructor).

For description, see INFO 3300 in CIS section.

[INFO 3400 Psychology of Social Computing (also COMM 3400)]

Fall. 3 credits. Prerequisite: COMM/INFO 2450. Next offered 2010-2011.

For description, see COMM 3400.]

INFO 3450 Human-Computer Interaction Design (also COMM 3450) (SBA)

Fall. 3 credits. Prerequisite: INFO 2450 or permission of instructor. May be taken simultaneously with INFO 2450.

For description, see COMM 3450.

[INFO 3490 Media Technologies (also COMM 3490, STS 3491) (CA)]

Spring. 3 credits. Offered odd-numbered years; next offered 2010-2011.

For description, see COMM 3490.]

INFO 3551 Computers: From the 17th Century to the Dotcom Boom (also STS 3551)

Fall. 4 credits.

For description, see STS 3551.

INFO 3561 Computing Cultures (also STS 3561) (CA)

Spring. 4 credits. No technical knowledge of computer use presumed or required. INFO 3551 and 3561 may be taken separately or in any order.

For description, see STS 3561.

INFO 3650 Technology and Collaboration (also COMM 3650) (SBA)

Spring. 3 credits. Prerequisite: INFO 2450.

For description, see COMM 3650.

[INFO 3660 History and Theory of Digital Art (also ARTH 3650) (CA)]

Fall. 4 credits. Next offered 2010-2011.

For description, see ARTH 3650.]

INFO 4290 Copyright in the Digital Age (also COMM 4290) (CA)

Fall. 3 credits. Offered odd-numbered years.

For description, see COMM 4290.

INFO 4300 Information Retrieval (also CS 4300)

Fall. 3 credits. Prerequisite: CS 2110 or equivalent.

For description, see INFO 4300 in CIS section.

INFO 4302 Web Information Systems (also CS 4302)

Spring. 3 credits. Prerequisites: CS 2110 and some familiarity with web site technology.

For description, see INFO 4302 in CIS section.

[INFO 4350 Seminar on Applications of Information Science (also INFO 6350)]**INFO 4400 Advanced Human-Computer Interaction Design (also COMM 4400) (SBA)**

Spring. 3 credits. Prerequisite: INFO 3450.

For description, see COMM 4400.

INFO 4450 Seminar in Computer-Mediated Communication (also COMM 4450) (SBA)

Spring. 3 credits. Prerequisite: INFO 2450.

For description, see COMM 4450.

INFO 4470 Social and Economic Data (also ILRLE 4470)

Fall. 4 credits. Prerequisites: one semester of calculus, IS statistics requirement, at least one upper-level social science course, or permission of instructor.

For description, see INFO 4470 in CIS section.

INFO 4500 Language and Technology (also COMM 4500) (SBA)

Spring. 3 credits. Prerequisites: INFO 2450 or permission of instructor.

For description, see COMM 4500.

INFO 4900 Independent Reading and Research

Fall, spring. 1–4 credits.

Independent reading and research for undergraduates.

INFO 4910 Teaching in Information Science, Systems, and Technology

Fall, spring. Variable credit.

Involves working as a TA in a course in the information science, systems, and technology major.

[INFO 5150 Culture, Law, and Politics of the Internet (SBA)]**INFO 5300 The Architecture of Large-Scale Information Systems (also CS 5300)**

Spring. 4 credits. Prerequisite: INFO 3300 or CS 4320.

For description, see INFO 5300 in CIS section.

INFO 6140 Cognitive Psychology (also COGST/PSYCH 6140)

Spring. 4 credits.

For description, see PSYCH 6140.

INFO 6300 Advanced Language Technologies (also CS 6740)

Fall, spring. 3 credits. Prerequisite: permission of instructor. Neither INFO 4300 nor CS 4740 are prerequisites.

For description, see CS 6740 in CIS section.

INFO 6341 Information Technology in Sociocultural Context (also STS 6341)

Spring. 4 credits.

For description, see INFO 6341 in CIS section.

[INFO 6350 Seminar on Applications of Information Science (also INFO 4350)]**INFO 6400 Human-Computer Interaction Design (also COMM 6400)**

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor.

For description, see COMM 6400.

INFO 6450 Seminar in Computer-Mediated Communication (also COMM 6450)

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor.

For description, see COMM 6450.

[INFO 6648 Speech Synthesis by Rule (also LING 6648)]

Spring. 4 credits. Prerequisite: LING 4401, 4419, or permission of instructor. Next offered 2010–2011.

For description, see LING 6648.]

INFO 6500 Language and Technology (also COMM 6500)

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor.

For description, see COMM 6500.

[INFO 6850 The Structure of Information Networks (also CS 6850)]**INFO 7090 IS Colloquium**

Fall, spring. 1 credit. For staff, visitors, and graduate students interested in information science.

INFO 7900 Independent Research

Fall, spring. Variable credit. Prerequisite: permission of an information science faculty member.

Independent research for M.Eng. students and pre-A exam Ph.D. students.

INFO 9900 Thesis Research

Fall, spring. Variable credit. Prerequisite: permission of an information science faculty member.

Thesis research for post-A exam Ph.D. students.

INTERNATIONAL AGRICULTURE AND RURAL DEVELOPMENT

IARD 2020 Perspectives in International Agriculture and Rural Development

Fall. 3 credits. R. Nelson, R. Herdt, and L. Harrington.

The course is designed to enable students to gain an understanding of major issues in international agricultural development. It provides an overview of world poverty and hunger and of varying perspectives on approaches being taken to address these and related problems. Students will characterize the state of agriculture and rural livelihoods in selected developing countries, and will analyze how innovations in agriculture in these countries can contribute to rural development.

IARD 4010 Experience Latin America: Rural and Urban Realities I (also LATA 4010)

Fall. 2 credits. T. Tucker and D. Castillo.

Acquaints students with fundamental cultural, historical, socio-political, literary, anthropological, health, agricultural, and development issues in southern Mexico. The lectures/discussions establish the global and regional contexts for better transcultural understanding. This course may be taken as a stand-alone survey course in international agriculture and rural development or in Latin American studies. However, it is primarily a preparatory course for participants selected to participate in the spring-semester course Experience Latin America II: Chiapas Edition (IARD or LATA 6010), which includes a field-study trip to southern Mexico (Chiapas during the January intersession).

IARD 4020 Agriculture in Developing Nations I (also FDSC 4020)

Fall. 2 credits. K. V. Raman and W. R. Coffman.

Acquaint students with the major issues and problems in international agriculture and rural development and to demonstrate how problems in development are being addressed in India and Thailand. The lectures/discussions establish the global and regional contexts for sustainable agricultural development and focus on development challenges in Asia through cases in India and Thailand. This course may be taken as a stand-alone survey course in international agriculture and rural development. However, it is primarily a preparatory course for participants selected to participate in the spring-semester course Agriculture in the Developing Nations II (IARD 6020), which includes a field trip to Asia during the January intersession.

IARD 4030 Traditional Agriculture in Developing Countries (also CSS 4030)

Fall. 1 credit. S–U grades only. P. Hobbs.

For description, see CSS 4030.

IARD 4040 Crop Evolution, Domestication, and Diversity (also PLBR/BIOPL 4040)

Fall. 2 credits. Prerequisite: BIOGD 2810 or PLBR 2250 or permission of instructor. S–U or letter grades. S. Kresovich.

For description, see PLBR 4040.

IARD 4050 Patents, Plants, and Profits: Intellectual Property Management for Scientists and Entrepreneurs (also PLBR 4050)

Spring. 3 credits. Prerequisite: senior or graduate standing. S–U or letter grades. A. F. Krattiger and S. Kowalski.

For description, see PLBR 4050.

IARD 4140 Tropical Cropping Systems: Biodiversity, Social, and Environmental Impacts (also CSS 4140)

Fall. 3 credits. Prerequisite: introductory crop science, soil science, or biology course or permission of instructor. P. Hobbs.

For description, see CSS 4140.

IARD 4800 Global Seminar: Building Sustainable Environments and Secure Food Systems for a Modern World (also FDSC/NTRES 4800)

Spring. 3 credits. Prerequisite: junior, senior, or graduate standing. J. Lassoie and D. Miller.

For description, see NTRES 4800.

IARD 4910 Food, Farming, and Personal Belief (also CSS 4910)

Spring, 1 credit. Prerequisites: Sustainable Agriculture (CSS 1900) or equivalent recommended. S-U grades only. G. Fick. For description, see CSS 4910.

IARD 4940 Special Topics in International Agriculture and Rural Development (also LATA 4940)

Fall, spring, summer. 1-3 credits. S-U or letter grades. Staff.

The department teaches "trial" courses, and special topics not covered in other courses, at the undergraduate level, under this number. Offerings vary by semester and will be advertised by the department. Courses offered under the number are approved by the department curriculum committee, and the same course is not offered more than twice under this number.

IARD 4960 International Internship

Fall, spring. 1-6 credits. Prerequisite: submission of approved internship form (see CALS internship policy guidelines). S-U or letter grades. Staff.

International internship, supervised by a faculty member who is directly involved in determining both the course content and in evaluating a student's work. The student researches and initiates an appropriate international internship and negotiates a learning contract with the faculty supervisor, stating the conditions of the work assignment, supervision, and reporting. All 4960 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

IARD 4970 Independent Study in IARD

Fall and spring. 1-3 credits. Prerequisite: permission of instructor. S-U or letter grades. Students must register using independent study form (available in 140 Roberts Hall). Staff.

Allows students the opportunity to investigate special interests that are not treated in regularly scheduled courses. The student develops a plan of study to pursue under the direction of a faculty member.

IARD 5980 International Development M.P.S. Project Paper

Fall and spring. 1-6 credits; max. 6 credits may be applied toward M.P.S. degree. Prerequisite: M.P.S. candidates in field of international development (ID). S-U grades only. N. Uphoff.

Problem-solving project entailing either fieldwork and/or library work. The aim of the project is to give students supervised experience in dealing intellectually and analytically with a professional problem related to a substantive area of international development.

IARD 5990 International Agriculture and Rural Development M.P.S. Project Paper

Fall and spring. 1-6 credits; maximum of 6 credits may be applied toward M.P.S. degree requirements. Prerequisite: M.P.S. candidates in field of international agriculture and rural development (IARD). S-U grades only. S. Kyle.

Problem-solving project entailing either fieldwork and/or library work. The aim of the project is to give students supervised experience in dealing intellectually and analytically with a professional problem related to a substantive area of international agriculture and rural development.

IARD 6010 Experience Latin America II (Chiapas Edition) (also LATA 6010)

Spring, 3 credits. Prerequisite: IARD or LATA 4010. T. Tucker and D. Castillo.

Designed to provide students with an opportunity to observe the rich living cultures, environments, ecologies, rural and urban communities, and development issues in tropical southern Mexico. Also designed to promote interdisciplinary exchange among faculty, staff, and students and their Mexican hosts and counterparts. A two-week field-study trip in January is followed by discussions, written projects, and oral presentations dealing with a range of topics pertinent to the target cultures of Chiapas. Optional 1-credit discussion in Spanish can be taken concurrently (SPAN 3020).

IARD 6020 Agriculture in Developing Nations II (also FDSC 6020)

Spring, field trip to Asia during Jan. intersession. 3 credits. Prerequisites: IARD 4020 and (or) permission of instructors. Cost of field-study trip is \$4,000 (including airfare, local transportation, and lodging). Some merit and need-based financial aid may be available. K. V. Raman and W. R. Coffman.

Designed to provide students with an opportunity to observe agricultural development in Asia and to promote interdisciplinary exchange among faculty, staff, students and their Indian and Thai counterparts. A three-week field-study trip in January is followed by discussions, written projects, and oral presentations dealing with problems in food, agriculture, and livestock production in the context of social and economic conditions of India and Thailand.

IARD 6030 Planning and Management of Agriculture and Rural Development (also GOVT 6927)

Spring, 4 credits. N. T. Uphoff and T. W. Tucker.

Reviews experience and approaches in agricultural and rural development in a range of developing countries, with particular attention to contemporary issues of participation, decentralization, local institutions, capacity-building, civil society, social capital, and empowerment. Case studies from Asia, Africa, and Latin America.

IARD 6850 Training and Development: Theory and Practice (also EDUC 6850)

Spring, 4 credits. S-U or letter grades. R. Caffarella.

For description, see EDUC 6850.

IARD 6940 Graduate Special Topics in IARD

Fall or spring. 1-4 credits. S-U or letter grades. Staff.

The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

IARD 6960 Agroecological Perspectives for Sustainable Development (also NTRES/CSS 6960)

Fall, spring, 1 credit. S-U grades only. L. Fisher, L. Buck, and P. Hobbs.

A variety of speakers present seminars on agroecological topics relating to sustainable development throughout the world. Students

are required to prepare a synopsis of each seminar.

IARD 6970-6980 International Development M.P.S. Seminar

Fall, spring. 1 credit. S-U grades only. N. Uphoff.

For M.P.S. students to discuss important issues in international development and to prepare them to write their project papers. Specific content varies.

IARD 6990 International Agriculture and Rural Development M.P.S. Project Seminar

Fall, spring. 1 credit. Prerequisite: required for, and limited to, M.P.S. IARD students or permission of instructor. S-U grades only. S. C. Kyle.

Provides students with the opportunity to develop and present their special projects. Also serves as a forum for discussion of current issues in international agricultural and rural development, with particular attention to interdisciplinary complexities.

IARD 7830 Farmer-Centered Research and Extension (also EDUC 7830)

Fall, 3 credits. S-U or letter grades. T. Tucker.

Introduction to participatory traditions in farming systems research, extension, evaluation of rural development, technology generation, gender analysis, participatory rural appraisal, and documentation of local and indigenous knowledge of community-based development. Case studies of farmer-centered research and extension provide a focus for analysis. Appropriate roles of researchers and extensionists as partners with farmers are examined. A major contribution of farmer-centered research and extensions is its potential to legitimize people's knowledge by enhancing their capacity to critically analyze their own problems, conduct their own research and empower them to take direct action to solve those problems.

LANDSCAPE ARCHITECTURE

P. J. Trowbridge, chair (443 Kennedy Hall, 255-2738); S. Baugher, J. Foster, K. L. Gleason, A. Hammer, P. H. Horrigan, D. W. Krall, L. J. Mirin, A. Okigbo, D. Ruggeri

LA 1410 Grounding in Landscape Architecture

Fall, 4 credits. Limited to 15 students. Letter grades only. Fee for required package of drafting equipment plus materials for projects: approx. \$300.

Introduction to the representation and design of landscapes and to working in a studio setting. Uses freehand drawing, measured drawing, and model making to understand design principles of the landscape within a cultural and ecological paradigm.

LA 1420 Grounding in Landscape Architecture

Spring, 4 credits. Limited to approx. 20 students. Prerequisite: freshman landscape architecture majors or permission of instructor. Required drafting equipment plus project supplies: approx. \$250.

Applies fundamentals of landscape design to small-scale site-planning projects. Work in the studio introduces students to the design process, design principles, construction materials, planting design, and graphics.

LA 2010 Medium of the Landscape

Fall. 5 credits. Prerequisite: landscape architecture majors. Required drafting equipment, supplies, and fees: approx. \$200; field trip: approx. \$250.

Studio course emphasizing the design process and principles involved in organizing and giving form to outdoor space through the use of structures, vehicular and pedestrian circulation systems, earthforms, water, and vegetation.

LA 2020 Medium of the Landscape

Spring. 5 credits. Prerequisite: LA 2010 with grade of C or better. Supplies and fees: approx. \$250; field trip: approx. \$250.

Focuses on the role of materials in design, design theory, and design vocabulary associated with landscape architecture projects.

[LA 2150 Writing Seminar: Engaging Places

Fall. 4 credits. Lec. Next offered 2010–2011. A. Hammer.

Explores how places come to be what they are, how they shape—and are shaped by—the people who live in them, how they become coordinates for plotting both a culture's biography and the meaning of a life. While the course serves as an introduction to cultural landscape studies, or the interaction of people and place, its focus is on writing: how do we represent the complexity of a place and our relation to it?

[LA 2610 Fieldwork in Urban Archaeology (also CRP/ARKEO 2610) (CA) (LA)]**[LA 2620 Laboratory in Landscape Archaeology (also ARKEO 2620)]****LA 2820 Photography and the American Landscape (CA) (LA)**

Fall. 3 credits. A. Hammer.

Interdisciplinary study of the relationship between photography, the American landscape, and cultural meaning. Topics include representation and perception, photography and painting in the 19th century, expeditionary surveys and national identity, pictorialism, the American sublime, photography and tourism, modernism and postmodernism, the industrial landscape and American ruins, and contemporary practice.

LA 3010 Integrating Theory and Practice I

Fall. 5 credits. Prerequisite: LA 2020 with grade of C or better. Supplies and fees: approx. \$250; field trip: approx. \$250.

This studio engages participants in the art and science of design as well as focusing on site-scaled projects that consider significant cultural and natural landscapes. This course explores theories of landscape design, restoration, sustainable design, and landscape representation through projects that derive form from a specific site and place.

LA 3020 Integrating Theory and Practice II

Spring. 5 credits. Supplies and fees: approx. \$250; field trip: approx. \$250; international studios: \$500.

Studio building on prior course work with an expectation that participants can creatively manipulate the program and conditions of a site, with increased emphasis on contemporary construction technology. Focuses on the expression of design solutions that grow from and affirm an explicit sense

of site and place. Social, cultural, physical, and historical factors and their relationship to site design and planning are critically explored through theory and practice.

LA 3160 Site Engineering

Fall. 5 credits.

Lectures and studio projects dealing with earthwork estimating; storm water management, site surveys, site layout, and horizontal and vertical road alignment.

LA 3180 Site Construction

Spring. 5 credits. Prerequisite: permission of instructor. P. Trowbridge.

This course emphasizes detail design and use of landscape materials in project implementation. It explores construction materials, including specifications, cost estimates, and methods used by landscape architects in project implementation. It includes lectures, studio problems, and development of drawings leading to construction documentation for one or more comprehensive projects.

[LA 3600 Pre-Industrial Cities and Towns of North America (also ARKEO 3600, CRP 3600/6660, LA 6660) (CA) (LA)]**LA 4010 Urban Design Studio**

Fall. 5 credits.

This studio focuses on the integration of theory and practice in landscape architecture at the urban scale. Urban design methods and strategies are introduced and applied to city-scaled projects including community engagement.

LA 4020 Integrating Theory and Practice II

Spring. 5 credits. Supplies and fees: approx. \$250; field trip: approx. \$250.

Studio focusing on the expression of design solutions that grow from and affirm an explicit sense of site and place. Social, cultural, physical, and historic factors and their relationships to site design and planning are critically explored through theory and practice in this studio.

LA 4030 Directed Study: The Concentration

Fall, spring. 1 credit. Prerequisite: landscape architecture undergraduates in final year of study.

Working with their advisor, students create a written and visual paper that documents the concentration intent.

LA 4100 Computer Applications in Landscape Architecture

Fall or spring. 3 credits. Limited to 15 students. Prerequisite: landscape architecture students. S. Curtis.

Designed to develop a working knowledge of various computer software applications with emphasis on Autocad. Explores other applications relative to land-use planning and the profession of landscape architecture.

LA 4120 Professional Practice

Fall. 1 credit.

This course presents the student with an understanding of the emerging role of the professional landscape architect. The course helps students choose a type of practice and introduces the problems and opportunities one may encounter in an office or in other professional situations. Topics include job-seeking preparation, practice diversity, marketing professional services, office and

project management, construction management, computers in the profession, and ethics.

LA 4180/7900 Audio Documentary: Stories from the Land (CA) (LA)

Spring. 3 credits. Limited to 15 students.

Letter grades only. A. Hammer.

Offers hands-on experience in basic audio documentary. Students create aural portraits of New York landscapes and communities undergoing critical change. Encourages projects appropriate for podcasting, webcasting, and radio. Explores relationship between sound and the still or moving image.

LA 4830 Seminar in Landscape Studies (CA) (LA)

Spring. 3 credits. Prerequisite: senior or graduate standing in any major or field.

Topical seminar with a different subject and method each time it is offered.

LA 4860/7910 Placemaking by Design

Fall. 3 credits. Limited to 20 students.

Priority given to juniors, seniors, and graduate students. S–U or letter grades. P. Horrigan.

Seminar providing an understanding of contemporary planning and landscape architecture design strategies that reaffirm and reclaim a sense of place. Readings and discussions focus on the theory and practice of placemaking as represented in the literature and in built works. Addresses the following questions: What constitutes a place-based design approach and what distinguishes it from other more conventional design approaches? Who are the key players shaping the theory and practice of placemaking?

LA 4910 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment (also HORT 4910)

Fall. 4 credits. Limited to 48 students.

Prerequisite: horticulture or landscape architecture majors or permission of instructors. Preregistration required. Supplies: approx. \$50; field trips: approx. \$25. P. Trowbridge and N. Bassuk.

Focuses on the identification, uses, and establishment of woody plants in urban and garden settings. By understanding the environmental limitations to plant growth, students are able to critically assess potential planting sites; select appropriate trees, shrubs, vines, and ground covers for a given site; and learn about the principles and practices of site remediation and plant establishment. Design followed by written specifications and graphic details is produced to implement these practices.

LA 4920 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment (also HORT 4920)

Spring. 4 credits. Limited to 48 students.

Prerequisite: horticulture or landscape architecture majors or permission of instructors; passing grade in HORT/LA 4910. Preregistration required. Supplies: approx. \$50; field trips: approx. \$25. P. Trowbridge and N. Bassuk.

Second half of course focusing on winter identification, uses, and establishment of woody plants in urban and garden settings. Issues of site assessment and soil remediation are emphasized in addition to soil volume calculations, drainage, surface detailing, and planting techniques. Students critically assess

potential planting sites and select appropriate trees, shrubs, vines, and groundcovers for a given site. Designs for specific sites are followed by written specifications and graphic details that are produced to implement these proposals. Students are engaged in a hands-on manner in site remediation and planting techniques they have learned by creating new landscapes that serve to integrate theory, principles, and practices. Together, HORT/LA 4910 and 4920 constitute an integrated course.

LA 4940 Special Topics in Landscape Architecture

Fall or spring. 1-3 credits; may be repeated for credit. S-U or letter grades. Topical subjects in landscape architectural design, theory, history, or technology. Group study of topics not considered in other courses.

LA 4950 Green Cities: The Future of Urban Ecology (also CRP 3840/5840)

Fall. 4 credits. R. Young. Explores the history and future of the ecology of cities and their role in solving the present global ecological crisis. Examines the politics, design, and economics of "green cities" in terms of transportation, renewable energy, solid waste and recycling, land use, and the built environment.

LA 4970 Individual Study in Landscape Architecture

Fall or spring. 1-5 credits; may be repeated for credit. Students must register using independent study form (available in 140 Roberts Hall). S-U or letter grades. Work on special topics by individuals or small groups.

LA 4980 Undergraduate Teaching

Fall or spring. 1-2 credits. Prerequisites: previous enrollment in course to be taught and permission of instructor. Students must register using independent study form (available in 140 Roberts Hall). Designed to give qualified undergraduates experience through actual involvement in planning and teaching courses under the supervision of department faculty members.

LA 4990 Undergraduate Research

Fall or spring. 1-5 credits. Students must register using independent study form (available in 140 Roberts Hall). Permits outstanding undergraduates to carry out independent research in landscape architecture under academically appropriate faculty supervision. Research goals should include description, prediction, and explanation, and should generate new knowledge in the field of landscape architecture.

LA 4991 Undergraduate Honors Research in Landscape Architecture

Fall or spring. 1-5 credits. Students must register using independent study form (available in 140 Roberts Hall). Permits outstanding students to carry out independent research in landscape architecture under appropriate faculty supervision. Research goals should include description, prediction, and explanation and should generate new knowledge in the field of landscape architecture.

LA 5010 Composition and Theory

Fall. 5 credits. Prerequisite: graduate standing. Drafting supplies and fees: approx. \$250; field trip: approx. \$250. Basic principles of natural and cultural processes that form "places" in the landscape. Projects focus on design applied to the practice of landscape architecture: particularly the relationship between measurement, process, experience, and form at multiple scales of intervention.

LA 5020 Composition and Theory

Spring. 5 credits. Prerequisite: graduate standing. Drafting supplies and fees: approx. \$250; field trip: approx. \$250. Studio focusing on the spatial design of project-scale site development. Students develop their expertise in applying the design theory, vocabulary, and graphic expression introduced in LA 5010.

LA 5050 Landscape Representation I

Fall. 3 credits. Corequisite: LA 5010 or permission of instructor. Introduces students to both conventional and unconventional modes of landscape architectural design representation. Teaches drafting, orthographic drawing, axonometric project, lettering, analysis, and concept drawing alongside more expressive modes of direct site study and representation.

LA 5060 Graphic Communication II

Spring. 3 credits. Prerequisite: LA 5050. Corequisite: LA 5020 or permission of instructor. Intermediate-level course focusing on modes of landscape representation from ideation to presentation. Representation modes may include freehand, process drawing, analysis and orthographic drawing; concept modeling; composite drawings; and visual books.

LA 5240 History of European Landscape Architecture*

Fall. 3 credits. L. Mirin. *Offered through College of Architecture, Art, and Planning.

LA 5250 History of American Landscape Architecture*

Spring. 3 credits. L. Mirin. *Offered through College of Architecture, Art, and Planning.

LA 5450 The Parks and Fora of Imperial Rome

Spring. 3 credits. Prerequisites: advanced standing in a design field, classics, or history of art, other disciplines, or permission of instructor. K. Gleason. Advanced seminar seeking an interdisciplinary group of students in classics, art history, archaeology, landscape architecture, horticulture, and architecture to bring their knowledge of Latin, Greek, Italian, archaeology, drawing, design, or computer modeling to a collaborative study of the ancient forums and public parks of the ancient Roman world. Seminar involves students in current research and publication in this emerging area of archaeology and landscape history.

LA 5820 Photography and the American Landscape

Fall. 3 credits. A. Hammer. Interdisciplinary study of the relationship between photography, the American landscape, and cultural meaning. Topics include representation and perception, photography and painting in the 19th century,

expeditionary surveys and national identity, pictorialism, the American sublime, photography and tourism, modernism and postmodernism, the industrial landscape and American ruins, and contemporary practice.

LA 5900 Theoretical Foundations

Spring. 2 credits. Prerequisite: senior or graduate standing. A. Hammer. This seminar is intended to provide students in the Department of Landscape Architecture with an overview of the theories and discourses related to the field. Topics may include, but not be limited to, environmental perception, issues of language and representation, pertinent debate in cultural geography, developments in ecological design, landscape urbanism, infrastructure, etc. Weekly readings, discussion, short papers.

LA 5970 Graduate Individual Study in Landscape Architecture

Fall or spring. 1-5 credits; may be repeated for credit. Work on special topics by individual or small groups.

LA 5980 Graduate Teaching

Fall or spring. 1-3 credits. Prerequisite: permission of instructor. Staff. Designed to give qualified students experience through involvement in planning and teaching courses under the supervision of faculty members. The experience may include leading discussion sections, preparing, assisting in desk critiques, and presenting lectures. There are assigned readings and discussion sessions on education theory and practice throughout the semester. (Credit hours are determined by the formula: 2 hours per week = 1 credit hour.)

LA 6010 Integrating Theory and Practice I

Fall. 5 credits. Prerequisite: graduate standing or permission of instructor. Supplies and fees: approx. \$250. This studio focuses upon site-scaled projects that consider significant cultural and natural landscapes. Explores theories of landscape restoration, sustainable design, and landscape representation. These are explored through projects that derive form from specific site and place. The integration of site history, ecology, and site construction supports an understanding and relationship between theory and practice.

LA 6020 Integrating Theory and Practice II

Spring. 5 credits. Prerequisite: graduate standing. Drafting supplies and fees: approx. \$250; field trip: approx. \$250. This studio builds on prior course work with an expectation that participants can creatively manipulate the program and conditions of a site, with increased emphasis on contemporary construction technology. Projects focus upon the expression of design solutions that grow from and affirm an explicit sense of site and place. Social, cultural, physical, and historic factors and their relationship to site design and planning are critically explored through theory and practice.

LA 6030 Directed Study: The Concentration

Fall, spring. 1 credit. Prerequisite: landscape architecture graduate students in final year of study.

Working with their advisor, students create a written and visual paper that documents the concentration intent.

LA 6160 Site Engineering

Fall. 5 credits.

Lectures and studio projects dealing with earthwork estimating, storm water management, site surveys, site layout, and horizontal and vertical road alignment.

LA 6180 Site Construction

Spring. 5 credits. Prerequisite: permission of instructor. P. Trowbridge.

This course emphasizes detail design and use of landscape materials in project implementation. It explores materials, including specifications, cost estimates, and methods used by landscape architects in project implementation. It includes lectures, short studio problems, and the development of drawings leading to construction documentation for one or more comprehensive projects.

LA 6660 Pre-Industrial Cities and Towns of North America (also CRP 6660)

Spring. 3 credits.

LA 6900 Methods of Landscape Architectural Inquiry

Spring. 3 credits. Prerequisite: graduate standing. S–U or letter grades.

This class builds on the theoretical foundations provided in LA 5900 with an investigation of the variety of methods used in landscape architectural and urban design research and practice. These methods may include, but are not limited to, physical analysis, mapping, site inventory, behavioral observations, cultural landscape investigations, surveys, and interviews. The format of the class combines weekly lecture and applied research.

LA 6940 Special Topics in Landscape Architecture

Fall or spring. 1–3 credits; may be repeated for credit. S–U or letter grades.

Topical subjects in landscape architectural design, theory, history, or technology. Includes group study of topics not considered in other courses.

LA 7010 Urban Design and Planning

Fall. 5 credits. Prerequisite: graduate standing. Supplies and fees: approx. \$250; required field trip: approx. \$50.

This studio explores the application of urban design and landscape urbanism techniques to the problems and opportunities of contemporary city making. The studio investigates the social, cultural, natural, and infrastructural systems of urban environments, and develops integrated spatial design strategies involving streets, built form, and open space networks. The course introduces three-dimensional computer modeling and digital design media as tools for urban design.

LA 7020 Advanced Design Studio

Spring. 5 credits.

This advanced design studio provides students in the final year of the graduate program in Landscape Architecture with the opportunity to work on complex, real-time projects. The overarching goal of this class is to test the student's theoretical, methodological, technical, and representational competency and ability to engage with a range of scales and issues.

Through intensive studio work, seminar sessions, independent research, and site visits students will gain the knowledge and skills necessary to develop sound and creative solutions to environmental design problems.

LA 7900 Audio Documentary: Stories from the Land

Spring. 3 credits. Letter grades only. A. Hammer.

Offers hands-on experience in basic audio documentary. Students create aural portraits of New York landscapes and communities undergoing critical change. Encourages projects for podcasting, webcasting, and radio. Explores relationship between sound and the still or moving image.

LA 7910 Placemaking by Design

Fall. 3 credits. Limited to 20 students. S–U or letter grades. P. Horrigan.

Seminar providing an understanding of contemporary planning and landscape architecture design strategies that reaffirm and reclaim a sense of place. Readings and discussions focus on the theory and practice of placemaking as represented in the literature and in built works. Addresses the following questions: What constitutes a place-based design approach and what distinguishes it from other more conventional design approaches? Who are the key players shaping the theory and practice of placemaking?

LA 7920 Landscape Preservation: Theory and Practice

Fall. 3 credits. Prerequisite: junior, senior, or graduate standing. D. Krall.

Examines the evolving practice of landscape preservation in the United States. Topics include the recent history of the discipline, methodology in documentation of historic landscapes, and important practitioners and notable projects. Format is assigned readings and discussion, invited speakers, lectures, and a project documenting a local site.

LA 8900 Master's Thesis in Landscape Architecture

Fall or spring. 9 credits.

Independent research, under faculty guidance leading to the development of a comprehensive and defensible design or study related to the field of landscape architecture. Work is expected to be completed in final semester of residency.

NATURAL RESOURCES

M. E. Krasny, chair (118 Fernow Hall, 255-2822); M. B. Bain, B. L. Bedford, B. Blossey, S. R. Broussard-Allred, L. E. Buck, E. Cooch, P. Curtis, D. J. Decker, J. Dickinson, T. J. Fahey, W. Fisher, G. Goff, M. P. Hare, J. R. Jackson, K. Kassam, B. A. Knuth, C. Kraft, J. P. Lassoie, B. Lauber, S. Morreale, L. Rudstam, R. Schneider, R. Sherman, P. J. Smallidge, C. R. Smith, R. C. Stedman, K. Sullivan, P. Sullivan, J. Tantilillo, D. Weinstein, S. Wolf, J. B. Yavitt

NTRES 1101 Intro to the Science and Management of Environmental and Natural Resources (also SNES 1101)

Fall. 3 credits. Prerequisite: first-year students accepted to Natural Resources, Science of Natural and Environment Systems, or Environmental Undecided majors in CALS. J. Yavitt and E. Madsen.

This course provides an overview of the science and management of natural and environmental resources. Material highlights facts and principles from the physical, biological, social, and economic sciences. The focus is on identifying knowledge required to enhance intelligent and sustainable management of the Earth's ecological and environmental systems. Case studies, guided readings, multi-media presentations, videos, discussions, and field and laboratory exercises are used to introduce students to the interdisciplinary basis for understanding the complexities of such systems within the text of modern society. Active student participation in all phases of the course is expected.

NTRES 1102 Introduction to Environmental Studies

Summer. 3 credits. S–U or letter grades. R. J. McNeil.

Discussion-centered course examining the interrelationships between the sciences, arts, and humanities as they relate to our environment. Students explore how we manage nature and negotiate with each other to meet our needs. Emphasis is on principles of ecology, economics, aesthetics, ethics, and law.

NTRES 1103 Science Fiction and Environment

Summer. 3 credits. S–U or letter grades. R. J. McNeil.

This course is intended to be primarily for Summer College students (high school rising seniors), new freshmen, Cornell staff, and other people with an interest in, but little formal background in, environmental studies. Science fiction short stories and two books will be used as vehicles for illustrating environmental predicaments and to enable easy discussion of environmental principles that may be helpful to us in choosing ways to live. Some extra attention to studying and learning may be helpful to new college students.

NTRES 2010 Environmental Conservation

Spring. 3 credits. T. Fahey.

Our lives increasingly are touched by questions about environmental degradation at local, regional, and global scales. Business as usual is being challenged. This course stimulates students to go beyond the often simplistic portraits of the environmental dilemma offered by the mass media to gain a firmer basis for responsible citizenship and action on environmental issues.

NTRES 2100 Introductory Field Biology

Fall. 4 credits. Limited to 60 students. Prerequisite: sophomore or junior standing with advisor in natural resources or permission of instructor; BIOG 1101–1102 or equivalent. Cost of two required overnight weekend field trips: approx. \$20. C. Smith.

Introduction to methods of inventorying, identifying, and studying plants and animals. Students are required to learn taxonomy, natural history, and how to identify approximately 170 species of vertebrates and 80 species of woody plants. Stresses selected aspects of current ecological thinking. Emphasizes the interaction of students with biological events in the field and accurate recording of those events.

NTRES 2201 Society and Natural Resources (also DSOC 2201) (SBA)

Spring. 3 credits. Letter grades only. R. Stedman.

The actions of people are crucial to environmental well-being. This course addresses the interrelationships between social phenomena and the natural (i.e., biophysical) environment. It is intended to: (1) increase student awareness of these interconnections in their everyday lives; (2) introduce students to a variety of social science perspectives, including sociology, economics, psychology, and political science, that help us make sense of these connections; (3) identify the contributions of each of these perspectives to our understanding of environmental problems; and (4) discuss how natural resource management and environmental policy reflect these perspectives.

NTRES 2320 Nature and Culture (HA) (CA)

Spring. 3 credits. S-U or letter grades. J. Tantillo.

We will examine the history of human-environment relationships, the diversity of environmental values and ethics, cultural manifestations of nature, and the role of society in forming natural resource and environmental policy. The history of natural resource conservation and management in North America, including the history and philosophy of ecology, will be introduced.

NTRES 2830 DNA, Genes, and Conserving Genetic Diversity

4 credits. Prerequisites: introductory biology or equivalent or permission of instructor. Letter grades only. Lec/lab. M. Hare.

This course is designed to provide a broad understanding of molecular, Mendelian, and population genetic principles relating to genetic diversity and its conservation. This class is recommended as a preliminary to upper-level ecology, evolution, and conservation biology courses. We will focus on eukaryotes and cover a broad range of molecular and cellular genetic concepts including DNA replication, recombination, and gene expression. Mendelian inheritance and linkage mapping also will be covered in depth before expanding the scope to population genetics and quantitative genetics. A laboratory section will be devoted to problem solving, computer exercises, and discussions.

NTRES 3030 Introduction to Biogeochemistry (also EAS 3030)

Fall. 4 credits. Prerequisites: college-level chemistry and a biology and/or geology course. J. B. Yavitt and L. A. Derry. For description, see EAS 3030.

NTRES 3100 Applied Population Ecology

Fall. 3 credits. Prerequisite: completion of calculus (MATH 1106, 1110, or equivalent). Highly recommended: background in biology or ecology. Letter grades only. E. Cooch.

In-depth analysis of the ecological factors influencing the natural fluctuation and regulation of animal population numbers. Examines models of single- and multi-species population dynamics, with emphasis on understanding the relationship between ecological processes operating at the individual level and subsequent dynamics at the population level. Significant emphasis is

placed on principles as applied to conservation and management. Computer exercises are used to reinforce concepts presented in lecture.

[NTRES 3110 Fish Ecology, Conservation, and Management]**[NTRES 3111 Fish Ecology Laboratory]****NTRES 3130 Biological Statistics I (also BTRY 3010, STS 2200)**

Fall. 4 credits. Prerequisite: one semester of calculus. P. Sullivan. Develops statistical methods and applies them to problems encountered in the biological and environmental sciences. Methods include data visualization, population parameter estimation, sampling, bootstrap resampling, hypothesis testing, the Normal and other probability distributions, and an introduction to modeling. Applied analysis is carried out in the Splus statistical computing environment.

[NTRES 3140 Conservation of Birds

Spring, summer. 2 credits. Prerequisite: NTRES 2100 or permission of instructor. Offered alternate years. Next offered 2010-2011. C. R. Smith.

A course for majors and nonmajors, focusing on science-based bird conservation and management at the organism, population, community, and landscape levels.]

[NTRES 3141 Conservation of Birds Laboratory

Spring, summer. 1 credit. Corequisite: NTRES 3140. Offered alternate years; next offered 2010-2011. C. R. Smith.

A field-oriented course designed to teach skills of bird observation and identification based on the integration of field marks, songs and calls, and habitat cues.]

NTRES 3220 Global Ecology and Management

Spring. 3 credits. Prerequisites: college-level biology and general ecology course. J. B. Yavitt.

The subjects of biogeography, ecology, and biodiversity have patterns and processes that emerge only at the global scale. Recognizing the global importance of these patterns and processes is even more imperative in light of the tremendous increase in the human population size and the effects of humans on the Earth. This course is an introduction to the field of global ecology. Topics include comparative ecology and biogeography, community ecology, island biogeography, and ramifications of global climatic change.

NTRES 3240 Ecological Management of Water Resources

Spring. 3 credits. Prerequisites: introductory ecology and introductory chemistry or permission of instructor. R. Schneider.

In-depth analysis of those ecological and biological principles relevant to the management of fresh and marine water resources, with emphasis on the effects of water management on community ecology. Lectures and discussion integrate scientific literature with current management issues. Topics include linkages between hydrologic variability and communities; groundwater-surface connections, flow paths for dispersal, patchily distributed water resources, and water quality controls on organisms.

[NTRES 3250 Forest Management and Maple Syrup Production]**NTRES 3260 Applied Conservation Ecology**

Spring. 3 credits. Prerequisite: BIOEE 2610 or permission of instructor. S. Morreale. Field and lab course designed to provide direct experience with some of the most important field methods and analytical techniques used to examine ecosystem and community function, structure, and value, especially within the context of contemporary conservation ecology and evolutionary theory. Tools include field sampling techniques, resource and conservation mapping, spatial referencing, GIS, measures of biodiversity, and manual and automated techniques for studying soil, stream, and forest biota and related physical factors.

NTRES 3300 Natural Resources Planning and Management

Fall. 3 credits. Prerequisite: junior standing. T. B. Lauber. Focuses on terrestrial and aquatic resources. Emphasizes the comprehensive planning process and human dimensions of resource management. Students integrate biological, social, and institutional dimensions of management through case studies. Grades are based on individual and group performance.

[NTRES 3311 Environmental Governance (also STS/BSOC/DSOC 3311) (SBA)]**NTRES 3320 Introduction to Ethics and Environment (KCM)**

Fall. 4 credits. J. Tantillo. Introduction to ethics, aesthetics, and epistemology as related to the environment. Asks the question "How should I live?" and explores the implications of different answers to that question for our treatment of nature. Also examines the various approaches to ethics theory; the relations between art, literature, religion, and mortality; the objective nature of value judgments; and the subjective nature of nature.

NTRES 3330 Ways of Knowing: Indigenous and Local Ecological Knowledge (also AIS 3330) (CA, SBA) (D)

Fall. 3 credits. Prerequisites: junior, senior, or graduate standing. K-A. Kassam. Based on indigenous and local "ways of knowing," this course: (1) presents a theoretical and humanistic framework from which to understand generation of ecological knowledge; (2) examines processes by which to engage indigenous and local knowledge of natural resources, the nonhuman environment, and human-environment interactions; and (3) reflects upon the relevance of this knowledge to climatic change, resource extraction, food sovereignty, and issues of sustainability and conservation.

NTRES 4100 Advanced Conservation Biology: Concepts and Techniques

Fall. 3 credits. Limited to 30 students. Prerequisite: CALS math requirement; NTRES 3100 or equivalent or permission of instructor. E. G. Cooch. A thorough analysis of the ecological and quantitative dimensions for decision making in modern conservation biology and management. Emphasis is on formal analysis of variation and maintenance of biological diversity, and will focus on principles and quantitative techniques, including

demographic viability analysis of populations, genetic analysis, and adaptive management.]

[NTRES 4110 Quantitative Ecology and Management of Fisheries Resources]

Spring. 4 credits. Prerequisites: NTRES 3130 recommended or permission of instructor. S–U or letter grades. Offered alternate years; next offered 2010–2011. P. J. Sullivan.

Examines the dynamics of marine and freshwater fisheries resources with a view toward observation, analysis, and decision making within a quantitative framework.]

[NTRES 4120 Wildlife Population Analysis: Techniques and Models]

Spring. 3 credits. Prerequisites: NTRES 3100 or 4100 (or equivalent or permission of instructor), NTRES statistics requirement. Lec/lab. Offered alternate years; next offered 2010–2011. E. Cooch.

This course will explore the theory and application of a variety of statistical estimation and modeling techniques used in the study of wildlife population dynamics.]

NTRES 4130 Biological Statistics II (also BTRY 3020, STS 3200)

Spring. 4 credits. Prerequisite: NTRES 3130 or BTRY 3010. P. Sullivan.

Applies linear statistical methods to quantitative problems addressed in biological and environmental research. Methods include linear regression, inference, model assumption evaluation, the likelihood approach, matrix formulation, generalized linear models, single-factor and multifactor analysis of variance (ANOVA), and a brief foray into nonlinear modeling. Applied analysis is carried out in the Splus statistical computing environment.

NTRES 4200 Forest Ecology

Fall. 3 credits. Prerequisite: introductory biology. T. J. Fahey.

Comprehensive analysis of the distribution, structure, and dynamics of forest ecosystems. Topics include paleoecology of forests; ecophysiology of forest trees; disturbance, succession, and community analysis; primary productivity; and nutrient cycling.

NTRES 4201 Forest Ecology Laboratory

Fall. 1 credit. Corequisite: NTRES 4200.

Weekend trip: approx. \$30. T. J. Fahey. Field trips designed to familiarize students with the nature of regional forests and to provide experience with approaches to quantifying forest composition and its relation to environmental factors. Optional weekend field trips to Adirondacks and to the White Mountains, New Hampshire. Includes group research projects in local forests.

NTRES 4220 Wetland Ecology Lecture

Fall. 3 credits. Prerequisite: BIOEE 2610. B. L. Bedford.

Examination of the structure, function, and dynamics of wetland ecosystems with an emphasis on ecological principles required to understand how human activities affect wetlands. Topics include geomorphology, hydrology, biogeochemistry, plant and animal adaptations to wetland environments, and vegetation dynamics of freshwater and saline wetlands. Biodiversity conservation, state and federal wetland regulations, and other approaches to wetland protection are considered.

NTRES 4221 Wetland Ecology Laboratory

Fall. 1 credit. Optional. Corequisite: NTRES 4220. One all-day Sat field trip required. B. L. Bedford.

Integrated set of field and laboratory exercises designed to expose students to the diversity of wetland ecosystems; the vegetation, soils, water chemistry, and hydrology of wetlands in the region; methods of sampling wetlands vegetation, soils, and water; and methods of wetland identification and delineation.

NTRES 4240 Landscape Impact Analysis

Spring. 3 credits. Prerequisites: junior, senior, or graduate standing; one introductory and one advanced course in ecology, natural resources, or soil ecology. Offered alternate years. B. L. Bedford.

Advanced course in applied ecology focusing on environmental impact analysis within the context of watersheds, landscapes, and regions rather than individual development projects. The course seeks to critically examine the different temporal and spatial scales at which human impacts operate to alter natural resources and ecosystem services. This expanded perspective forces consideration of the ways in which different components of the environment, the patterning of those components in space and time, and past and present human actions interact to produce environmental effects. Lecture topics include an introduction to the environmental impact assessment process, ecosystem functions versus ecosystem services, the problem of determining “significant” impacts, fundamental concepts of scale, defining assessment boundaries in space and time, current conceptual frameworks for impact analysis of large geographic areas, tools available on-line for impact analysis, and detailed analysis of specific case studies. Students will work in teams to develop an integrated ecological assessment of a specific, large geographic area of the Earth.

NTRES 4260 Practicum in Forest Farming as an Agroforestry System (also HORT/CSS 4260)

Fall. 2 credits. Prerequisite: junior, senior, or graduate standing or permission of instructor. K. W. Mudge, L. E. Buck, and P. Hobbs.

For description, see HORT 4260.

[NTRES 4280 Principles and Practices of Applied Wildlife Science]

Spring. 3 credits. Prerequisites: NTRES 3100 or equivalent; permission of instructor. S–U or letter grades. Offered alternate years; next offered 2010–2011.

The course covers the theory and practice of solving wildlife-related resource issues. Differences between basic and applied wildlife science will be discussed.]

NTRES 4300 Environmental and Natural Resources Policy Processes

Spring. 3 credits. Prerequisites: junior standing; special application process. Lec, Wash., D.C., during winter session, approx. Jan. 6–16; three two-hour orientation sessions in fall semester and four two-hour sessions in Feb. and March. Fee: approx. \$500. Completed applications due by Oct. 15. Applications available by contacting map10@cornell.edu or at

www.dnr.cornell.edu/teaching/ugrad/courses. B. A. Knuth.

Intensive field-based exploration of the environmental policy process and its conceptual framework. Defining environmental problems; aggregating interests; agenda-setting; formulating and selecting alternative solutions; implementation and evaluation stages; roles of lobbyists, legislature, executive branch, and other actors. Case studies; discussion with about 20 prominent Washington policy makers who appear as guest panelists. Self-selected research topic requires conducting independent interviews with Washington experts, policy analysis paper, and oral presentation.

[NTRES 4310 Environmental Strategies (also DSOC 4320) (SBA)]

[NTRES 4320 Human Dimensions of Natural Resource Management]

NTRES 4330 Applied Environmental Philosophy (KCM)

Spring. 3 credits. Recommended: NTRES 3320. J. Tantillo.

Special topic for 2010: Environmental justice. Focuses on environmental philosophy and environmental ethics considered as an academic field. Major themes include anthropocentrism versus non-anthropocentrism, intrinsic value, monism versus pluralism, animal rights versus environmental ethics, and various approaches to environmental ethics, including deep ecology, ecofeminism, and pragmatism.

NTRES 4340 International Conservation: Communities and the Management of the World's Natural Resources

Fall. 4 credits. Prerequisite: junior, senior, or graduate standing. Letter grades only. J. Lassoie.

This course builds an interdisciplinary understanding of the conservation and management of protected areas and fragile landscapes around the world. It uses lectures, readings, library assignments, and multi-media information, including a new Internet-based platform linking students to conservation practitioners, to examine the role of local communities in protecting biodiversity and ecosystem services. Stakeholder analyses of case studies from Africa, Latin America, Asia, and the United States explore conservation science and management issues from different geopolitical perspectives.

NTRES 4440 Resource Management and Environmental Law (also CRP 4440)

Spring. 3 credits. Prerequisite: junior, senior, or graduate standing. S–U or letter grades. R. Booth.

For description, see CRP 4440.

NTRES 4560 Stream Ecology (also BIOEE 4560)

Fall. 4 credits. Prerequisite: BIOEE 2610 or permission of instructor. S–U or letter grades. One Sat field trip. Offered alternate years. C. Kraft and A. Flecker.

Lecture examines patterns and processes in stream ecosystems, including geomorphology and hydrology, watershed–stream interactions, trophic dynamics, biogeochemistry, disturbance, and conservation and management. Field and laboratory exercises focus on experimental and analytical

techniques used to study stream ecosystems, including techniques to measure stream discharge, physical habitat, water chemistry, and stream biota. Field project with lab papers.

NTRES 4800 Global Seminar: Building Sustainable Environments and Secure Food Systems for a Modern World (also FDSC/IARD 4800)

Spring. 3 credits. Prerequisite: junior, senior, or graduate standing. J. Lassoie and D. Miller.

Modernization has led to development pressures that have increasingly disrupted natural systems leading to widespread concerns about the long-term viability of important environmental and ecosystem services, including those critical to food security worldwide. This interdisciplinary course uses case studies to explore interrelationships among social, economic, and environmental factors basic to sustainable development. Cases examine contemporary issues identified by participants (i.e., population growth, genetically modified foods, biodiversity, sustainable resource management, global warming, and global responsibility). Cornell faculty members lead discussions in each of the major topic areas. In addition, students participate in discussions and debates with students from Sweden, Costa Rica, Honduras, and Australia through live interactive videoconferences and electronic discussion boards.

NTRES 4940 Special Topics in Natural Resources

Fall or spring. 4 credits max. S-U or letter grades.

The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

NTRES 4960 Internship in Natural Resources

Fall or spring. Credit TBA. Prerequisite: permission of instructor (academic staff in major). S-U or letter grades. Students must register using the CALS Course Enrollment Form for Undergraduates (available in 140 Roberts Hall).

On-the-job learning experience under the supervision of professionals in a cooperating organization. A learning contract is written between the faculty supervisor and the student, stating the learning objectives, conditions of the work assignment, nature of on-the-job supervision, and reporting requirements, including the formal basis on which the faculty supervisor will assign a grade. All 4960 internship courses must adhere to the CALS guidelines at <http://www.cals.cornell.edu/cals/current/student-research/internship/index.cfm>.

NTRES 4970 Individual Study in Environmental Social Science and Resource Policy

Fall, spring, or winter. Credit TBA. Prerequisite: permission of instructor. S-U or letter grades. Students must register using independent study form (available in 140 Roberts Hall). S. R. Broussard, T. Brown, L. E. Buck, D. J. Decker, J. Enck, K. Kassam, B. Knuth, J. Lassoie, T. B. Lauber, R. Stedman, J. Tantillo, and S. Wolf.

Individual study under faculty supervision. Topics in environmental social science resource policy are arranged depending on the interests of students and availability of staff.

NTRES 4971 Individual Study in Applied Ecology and Conservation Biology

Fall or spring. Credit TBA. Prerequisite: permission of instructor. S-U or letter grades. Students must register using independent study form (available in 140 Roberts Hall). M. Bain, E. Cooch, P. Curtis, T. Gavin, M. Hare, J. R. Jackson, C. Kraft, J. Lassoie, S. Morreale, M. Richmond, L. Rudstam, C. Smith, and P. Sullivan.

Individual study under faculty supervision. Topics in applied ecology or conservation biology are arranged depending on the interests of students and availability of staff.

NTRES 4972 Individual Study in Ecosystem Science and Biochemistry

Fall or spring. Credit TBA. Prerequisite: permission of instructor. S-U or letter grades. Students must register using independent study form (available in 140 Roberts Hall). B. Bedford, B. Blossy, T. Fahey, M. Krasny, R. Schneider, R. Sherman, P. Smallidge, and J. Yavitt.

Individual study under faculty supervision. Topics in ecosystem science and biogeochemistry are arranged depending on the interests of students and availability of staff.

NTRES 4980 Undergraduate Teaching in Natural Resources

Fall and spring. 1-4 credits. Prerequisite: permission of instructor. Students must register using independent study form (available in 140 Roberts Hall). S-U or letter grades.

Designed to give students an opportunity to obtain teaching experience by assisting in labs, field trips for designated sections, discussions, and grading. Students gain insight into the organization, preparation, and execution of course plans through application and discussions with instructor.

NTRES 4991 Honors Research in Natural Resources

Fall or spring. 1-6 credits, variable; may be repeated for credit. Prerequisite: enrollment in NTRES honors research program; students must register using independent study form (available in 140 Roberts Hall). NTRES Staff.

Intended for qualified students pursuing the research honors program in natural resources. Students must complete the CALS Honors program application by the third week of the fall semester of their senior year. The research supervisor should be a faculty member or senior research associate within NTRES.

NTRES 5900 Professional Projects—M.P.S.

Fall and spring. Credit TBA. Prerequisite: M.P.S. graduate students working on professional master's projects. S-U grades only.

NTRES 6000 Introduction to Graduate Study in Natural Resources

Fall. 2 credits. Prerequisite: beginning graduate students whose faculty advisors are in Natural Resources. S-U grades. C. E. Kraft.

Includes discussions of the role of science in natural resource management and conservation, with a particular focus on how scientists pursue career paths toward effective participation in this realm. Discussions focus on the practices of scientists and institutions that provide a framework for scientific endeavors.

NTRES 6010 Seminar on Selected Topics in Environmental Social Science and Resource Policy

Fall or spring. 1-4 credits. S-U grades only. Check with department for availability. Staff.

Selected readings and discussions of research and/or current issues in environmental social science and resource policy. Offering varies by semester and is subject to availability of staff.

NTRES 6040 Seminar on Selected Topics in Resource Policy and Management

Fall or spring. 1-4 credits. S-U grades only. Check with department for availability. Staff.

Special topics seminar on subjects related to resource policy and management. Offering varies by semester and is subject to availability of staff.

[NTRES 6110 Quantitative Ecology and Management of Fisheries Resources

Spring. 4 credits. Prerequisite: NTRES 3130 or permission of instructor. S-U or letter grades. Offered alternate years; next offered 2010-2011. P. J. Sullivan.

Taught in conjunction with NTRES 4110 (see description above). Students taking the course for graduate credit are asked, in addition to the 4000-level projects and homework, to construct and document a model of population or community dynamics that reflects and extends the concepts covered in the course.]

[NTRES 6120 Wildlife Population Analysis: Techniques and Models

Spring. 3 credits. Prerequisites: NTRES 3100 (or equivalent or permission of instructor), college-level math and statistics course. Offered alternate years; next offered 2010-2011. E. Cooch.

For description, see NTRES 4120.]

NTRES 6140 Seminar on Selected Topics in Applied Ecology and Conservation Biology

Fall and spring. 1-4 credits. Prerequisite: permission of instructor. S-U grades only. Check with department for availability. Staff.

Discussion of individual research, current problems, and current literature in applied ecology and conservation biology. Offering varies by semester and subject to availability.

NTRES 6160 Seminar on Selected Topics in Ecosystem Science and Biogeochemistry

Fall or spring. 1–4 credits. Prerequisite: upper-level undergraduate or graduate standing. S–U grades only. Check with department for availability. Staff.

Reviews current literature, student research, and selected topics of interest.

NTRES 6280 Principles and Practices of Applied Wildlife Science (also NTRES 4280)

Spring. 3 credits. Prerequisites: NTRES 3100 or equivalent; permission of instructor. S–U or letter grades. Offered alternate years; next offered 2010–2011.

For description, see NTRES 4280. Students taking the course for graduate credit are required to participate, read supplemental materials, and complete an additional out-of-class assignment.]

NTRES 6340 International Conservation: Communities and the Management of the World's Natural Resources

Fall. 4 credits, variable. Prerequisite: graduate students; seniors by permission of instructor. Letter grades only; S–U grades by permission of instructor. J. P. Lassoie.

For description, see NTRES 4340. Students taking the course for graduate credit are required to read supplemental materials, undertake more complex assignments, and participate in a seminar discussion once a week (TBA) with the instructor and other staff members, in addition to fully participating in NTRES 4340.

NTRES 6360 Systems in the Environment

Spring. 2 credits. Prerequisite: graduate student standing. S–U grades only. M. Bain.

Ecosystems are posed as human-natural entities that can be understood, managed, and conserved. Systems theory provides principles for analyzing ecosystems and ecosystem research provides practices and methods for conservation. Both perspectives will be developed to investigate ecosystems as units of management and study. Examples will range from sand to society with an emphasis on plants and animals.

NTRES 6700 Spatial Statistics

Spring. 3 credits. Prerequisites: BTRY 6010 and 6020. Highly recommended: introductory GIS course. S–U or letter grades. Offered alternate years. P. J. Sullivan.

Develops and applies spatial statistical concepts and techniques to ecological and natural resource issues. Topics include visualizing spatial data and analysis and modeling of geostatistical, lattice, and spatial point processes. Students should consider taking this course simultaneously with CSS 6200.

NTRES 6940 Special Topics in Natural Resources

Fall or spring. 4 credits max. S–U or letter grades.

The department teaches “trial” courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course

is not offered more than twice under this number.

NTRES 6960 Agroecological Perspectives for Sustainable Development (also IARD/CSS 6960)

Fall and spring. 1 credit. S–U grades only. L. Buck, L. Fisher, and S. DeGloria.

For description, see IARD 6960.

NTRES 6970 Graduate Individual Study in Natural Resources

Fall or spring. Credit TBA. Prerequisite: permission of instructor. S–U or letter grades. NTRES graduate faculty.

Study of topics in natural resources more advanced than, or different from, other courses. Subject matter depends on interests of students and availability of staff.

NTRES 7330 Social-Cultural and Ecological Role of Diversity (D)

Spring. 3 credits. Prerequisites: seniors and graduate students. K-A. Kassam and B. Blossey.

Given the dramatic and coupled nature of environmental and social change as well as the current limitations on understanding the implications of these changes for adaptation and resilience, this research seminar explores the roles of and linkages between biological and cultural diversity. The graduate seminar will: (1) examine the concepts of biological and cultural diversity; (2) explore empirical research that elaborates upon the relationship between biological and cultural diversity; and (3) determine the relevance of these coupled concepts to issues of sustainability and conservation.

NTRES 7600 Environment and Social Transitions: Graduate Seminar in Environmental Sociology (also DSOC 7600)

Fall or spring. 3 credits. Graduate students only. C. Geisler, S. Wolf, and R. Stedman.

For description, see DSOC 7600.

NTRES 7800 Graduate Seminar in Ornithology (also BIOEE 7800)

Fall or spring. 1 credit. S–U grades only. Undergraduates must have permission of instructor. J. Dickinson, W. Koenig, I. Lovette, A. Dhondt, and D. Winkler.

Group intensive study of current research in ornithology. Topics vary from semester to semester. Course may be repeated for credit.

NTRES 7900 Graduate-Level Thesis Research

Fall and spring. Credit TBA. Prerequisite: Ph.D. students **before** “A” exam has been passed. S–U grades only.

NTRES 8900 Master's Thesis Research

Fall and spring. Credit TBA. Prerequisite: graduate students working on master's thesis research. S–U grades only.

NTRES 9900 Doctoral-Level Thesis Research

Fall and spring. Credit TBA. Prerequisite: Ph.D. candidates **after** “A” exam has been passed. S–U grades only.

Related Courses in Other Departments

Courses in many other departments are relevant to students majoring in natural resources. The following list includes some of the most closely related courses but is not exhaustive.

Ecology and Biology (ENTOM 4550, 4700; BIOEE 2610, 2630, 2740, 2780, 3630, 4500, 4570, 4620, 4660, 4690, 4700, 4730, 4750, 4760, 4780; BIOMI 2900–2920, 3970, 4180; BIONB 2210, 2220; BIOPL 2410, 2470, 2480, 3420, 4480; CSS 4660, 4720; EAS 1540, 2200, 3010, 3030, 3500, 3510, 4400)

Environment and Society (DSOC 2010, 3240, 3400, 4100)

Environmental Law, Ethics, and Philosophy (STS 2061, CRP 3840, 4440, 4510, PHIL 2410, 2460, 3810)

Human Systems and Communication (COMM 2850, 3520, 4210, 4560, 4660; ENTOM 3350; CRP 3840)

Physical Sciences (BEE 1510, 2510, 3710, 4010, 4270, 4350, 4710, 4730, 4750; CSS 2600, 3650, 3720, 3970, 4110, 4200, 4830; EAS 1101, 1540, 3050; CEE 4320, 4510)

Public Policy and Politics (GOVT 2947, 3071, 3131, 4281; BSOC 4616)

Resource Economics (AEM 2500, 4310, 4500, 4510)

Spatial Data Interpretation (CSS 4110, 4200, 4650, 6200, 6600; DSOC 3140)

PLANT BREEDING AND GENETICS

T. Brutnell, E. S. Buckler, W. R. Coffman, W. De Jong, J. J. Doyle, E. D. Earle, V. Gracen, P. Gregory, O. Hoekenga, M. M. Jahn, J. L. Jannink, A. F. Krattiger, S. Kresovich, D. Matthews, L. Li, S. R. McCouch, M. A. Mutschler, R. J. Nelson, W. Pawlowski, K. V. Raman, T. L. Setter, F. Shotkoski, M. E. Smith, M. E. Sorrells, S. D. Tanksley, D. R. Viands. Emeritus: R. E. Anderson, H. M. Munger, R. P. Murphy, W. D. Pardee, R. L. Plaisted

PLBR 2010 Plants, Genes, and Global Food Production

Fall. 3 credits. May be used for partial fulfillment of CALS distribution requirement Physical and Life Sciences.

Prerequisite: one year introductory biology or permission of instructor. S. McCouch.

Introduction to plant breeding; offers a sense of the importance of the field, tracing its evolution from the pre-scientific days of crop domestication to modern applications of biotechnology. Offers examples of how breeding objectives are realized and raises questions about the environmental, social, and economic consequences of intensive food production systems. Emphasizes the connection between the genetics of plants, modern scientific research, and the potential to respond to the growing human demand for food, fiber, fuel, and environmental sustainability.

PLBR 2250 Plant Genetics

Spring. 3 or 4 credits; 2 credits if taken after BIOGD 2810. Prerequisites: one year of introductory biology or equivalent; permission of instructor for students who have taken BIOGD 2810. Staff.

Surveys the fundamentals of plant genetics and shows how this information is used in plant biology and allied agricultural sciences

and provides a basis for understanding the complex issues related to modern crop genetics. Topics include simple inheritance; linkage analysis; polyploidy; analysis of nuclear, chloroplast and mitochondrial genomes; pollination controls; and methods for analysis and manipulation of genes, chromosomes, and whole genomes. Examples and materials are drawn from diverse crops and plant species.

PLBR 2990 Introduction to Research Methods in Plant Breeding and Genetics

Fall, spring, or summer. 1-3 credits, variable. S-U grades only. Staff. Intended for students who are new to undergraduate research. Students may be reading scientific literature, learning research techniques, or assisting with ongoing research. Students must identify a faculty supervisor who determines the work goals and the form of the final report.

PLBR 4010 Plant Cell and Tissue Culture (also HORT 4030)

Fall. 3 credits. Prerequisite: plant biology or genetics course or permission of instructor. E. D. Earle. Provides broad coverage of techniques of plant tissue, cell, protoplast, embryo, and anther culture and the applications of those techniques to biological and agricultural studies. Examples include horticultural, agronomic, and endangered species. Genetic modification of plants via gene transfer and other manipulations of cultured cells is a major topic.

PLBR 4011 Plant Tissue Culture Laboratory (also HORT 4040)

Fall. 1 credit. Limited enrollment. Pre- or corequisite: PLBR 4010 or permission of instructor. S-U or letter grades. E. D. Earle. Provides hands-on experience in plant tissue culture and complements PLBR 4010. Lab work includes cell, tissue and organ culture techniques related to plant propagation, germplasm storage, and genetic manipulations. Experiments use a broad range of plant materials and include protoplast culture and *Agrobacterium*-mediated gene transfer.

PLBR 4030 Genetic Improvement of Crop Plants

Fall. 3 credits. Prerequisites: BIOGD 2810, PLBR 2250, or other standard genetics course and course in crops or horticulture. V. Gracen. Genetic enhancement of crop value to humans began with domestication and continues with farmers' variety development and scientifically trained plant breeders' applications of Mendelian, quantitative, and molecular genetics. This course examines crop genetic improvement methods by discussing the history and current practice of plant breeding, tools available to breeders, choices and modifications of those tools to meet specific objectives, and challenges plant breeders face in developing varieties for the future.

PLBR 4040 Crop Evolution, Domestication, and Diversity (also BIOPL/IARD 4040)

Fall. 2 credits. Prerequisite: BIOGD 2810 or PLBR 2250 or permission of instructor. S-U or letter grades. S. Kresovich.

Evolution, domestication, and breeding of crop plants have affected the current diversity we conserve and use. Based on advances in genetics, systematics, and crop improvement, this course presents an integrated approach to understanding and describing diversity of agricultural and horticultural species. Also addressed are underlying ethical, legal, and social issues affecting crop conservation and use.

PLBR 4050 Patents, Plants, and Profits: Intellectual Property Management for Scientists and Entrepreneurs (also IARD 4050)

Spring, eight weeks. 3 credits. Prerequisite: senior or graduate standing. S-U or letter grades. A. F. Krattiger and S. Kowalski. Covers statutory protection (copyright, trademarks, patents, plant variety protection), contracts (from material transfer to licensing), management of IP (e.g., freedom-to-operate, valuation, genetic resources, trade, and marketing), and negotiation. Emphasizes technology transfer and international aspects. The course is particularly relevant to students interested in science management, technology transfer, international agriculture, and business.

PLBR 4060 Methods of Plant Breeding Laboratory

Fall. 2 credits. Pre- or corequisite: PLBR 4030 or equivalent. S-U or letter grades. M. E. Sorrells. Field trips to plant breeding programs involve discussion of breeding methods used, overall goals, selection and screening techniques, and variety and germplasm release. Additional labs include selection techniques for various traits, intellectual property issues, genetically modified crops, and international agriculture. For a term project, each student designs a comprehensive breeding program on a chosen crop.

PLBR 4070 Nutritional Quality Improvement of Food Crops

Spring. 1 credit. Prerequisite: one year introductory biology or permission of instructors. S-U or letter grades. L. Li, L. Kochian, and R. Welch. Introduction to biofortification of crop plants for enhancing their nutritional quality and health-promoting properties. The course discusses strategies to increase the contents of micronutrients, vitamins, phytochemicals, as well as the qualities of proteins and lipids with regard to improving food crops for human nutrition and health.

PLBR 4075 Evolution of Plant Breeding and Genetics

Spring. 2 credits. Prerequisite: permission of instructors. Letter grades only. O. Hoekenga and T. Brutnell. We will discuss seminal research papers that advanced the fields of basic and applied plant genetics. We will juxtapose the original discovery with a recent report that speaks to our present understanding of the same phenomenon. Participation in discussion, a presentation, and end of term paper will determine the grade.

PLBR 4080 QTL Analysis: Mapping Genotype to Phenotype in Practice

Spring. 1 credit. Prerequisite: BTRY 6010 or 4070 or permission of instructor. J. L. Jannink and E. Buckler. Discussion of mating designs and populations as well as statistical models to identify genetic

loci that affect the phenotype and to predict breeding and genotypic value using DNA polymorphisms. Practical application to real datasets.

PLBR 4460 Plant Cytogenetics Laboratory

Spring, two-week module. 1 credit. Prerequisite: genetics course or permission of instructor. Check with department for further information. S-U grades only. W. Pawlowski. Aims to provide fundamental knowledge and techniques in plant cytogenetics. Emphasizes applications to research on plant genetics and plant breeding. Plant materials involve a wide range of crop species. Covers basic techniques for examination of plant chromosomes.

PLBR 4826 Plant Biotechnology (also BIOPL 4826)

Spring. 1 credit. Prerequisite: BIOPL 4831 or permission of instructor. S-U or letter grades. 12 lec. E. D. Earle. Current and proposed use of transgenic plants for agricultural and industrial purposes. Topics include procedures for gene introduction and control of gene expression, as well as strategies for obtaining transgenic plants that are resistant to insects, diseases, and herbicides, or have improved nutritional or processing characteristics. Other topics are use of transgenic plants for production of valuable products and for environmental remediation. Biosafety, social, legal, and international issues relating to plant biotechnology are discussed.

PLBR 4831 Concepts and Techniques in Plant Molecular Biology (also BIOGD/BIOPL/PLPA 4831)

Fall, eight weeks. 2 credits. Prerequisites: see BIOPL 4830. S-U or letter grades. Two lec and one day of disc per week. M. Hanson, T. Owens, and M. Scanlon. For description, see BIOPL 4831.

PLBR 4832 Proteomics and Protein Mass Spectrometry in Biology (also BIOPL/PLPA 4832)

Fall. 1 credit. Prerequisites: BIOGD 2810, BIOBM 3300 or 3320, or equivalent. Recommended: BIOBM 3310. S-U or letter grades. Offered alternate years. K. van Wijk. For description, see BIOPL 4832.

[PLBR 4833 Plant Genome Organization (also BIOPL 4833)]

PLBR 4835 Molecular Breeding (also BIOPL 4835)

Fall. 1 credit. S-U or letter grades. Offered alternate years. S. Tanksley. For description, see BIOPL 4835.

PLBR 4940 Special Topics in Plant Breeding

Fall or spring. 4 credits max. S-U or letter grades. The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

PLBR 4960 Internship in Plant Breeding

Fall or spring. Variable credit; may be repeated to max. of 6; minimum 60 on-the-job hours per credit granted. Prerequisites: junior or senior in plant breeding; minimum GPA of 3.0 in plant breeding courses; permission of advisor and enrollment during pre-enrollment period of semester before internship. S–U grades only. Students must attach to their course enrollment materials a CALS independent study, research, teaching, or internship form signed by faculty member who will supervise study and assign credits and grade. Staff.

On-the-job learning experience under the supervision of professionals in a cooperating organization. A learning contract is written between the faculty supervisor and student, stating the conditions of the work assignment, supervision, and reporting. All 4960 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

PLBR 4970 Individual Study in Plant Breeding

Fall or spring. Variable credit; may be repeated to max. of 6. Prerequisite: permission of instructor. S–U or letter grades. Students must register using independent study form (available in 140 Roberts Hall). Staff.

PLBR 4980 Undergraduate Teaching

Fall or spring. Variable credit; may be repeated to max. of 6. Prerequisites: permission of instructor and previous enrollment in course to be taught or equivalent. S–U or letter grades. Students must register using independent study form (available in 140 Roberts Hall). Staff. Undergraduate teaching assistance in a plant breeding course. Teaching experience may include leading a discussion section, preparing and teaching laboratories, and tutoring.

PLBR 4990 Undergraduate Research

Fall or spring. Variable credit. Prerequisite: permission of instructor. S–U or letter grades. Students must register using independent study form (available in 140 Roberts Hall). Staff.

Undergraduate research projects in plant breeding.

PLBR 6060 Advanced Plant Genetics

Spring. 3 credits. Prerequisites: BIOGD 2810 or equivalent and permission of instructor. S–U or letter grades. W. Pawlowski.

Advanced survey of genetics in higher plants including selected topics in transmission genetics, epigenetics, and chromosome biology. Emphasizes development of critical analytical skills through reading of current literature and a class project.

[PLBR 6180 Breeding for Pest Resistance (also HORT 6180)]**PLBR 6220 Seminar**

Fall or spring. 1 credit. S–U grades only. Staff, graduate students, and visitors.

PLBR 6500 Special Problems in Research and Teaching

Fall or spring. 1 or more credits. Prerequisite: permission of instructor supervising research or teaching. Staff.

PLBR 6940 Special Topics in Plant Breeding

Fall or spring. 4 credits max. S–U or letter grades.

The department teaches “trial” courses under this number. Offerings vary by semester, and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

[PLBR 7160 Perspectives in Plant Breeding Strategies]**PLBR 7170 Quantitative Genetics in Plant Breeding**

Spring. 3 credits. Prerequisites: PLBR 4030 and BTRY 6010 or equivalent. Letter grades only. Offered even-numbered years. D. R. Viands.

Discussion of quantitative genetics for more effective plant breeding. Specific topics include population genetics, linkage, components of variance (estimated from various mating designs); heritability; theoretical gain from selection; and genotypic and phenotypic correlation coefficients. During one period, plants in the greenhouse are evaluated to provide data for computing quantitative genetic parameters.

PLBR 7900 Graduate-Level Dissertation

Fall or spring. Variable credit. Prerequisite: doctoral students who have not passed “A” exam; permission of instructor. S–U grades. Graduate faculty.

PLBR 8900 Master’s-Level Thesis Research

Fall or spring. Variable credit. Prerequisite: master’s candidates; permission of instructor. S–U grades. Graduate faculty. For students working on a master’s thesis.

PLBR 9900 Doctoral-Level Dissertation Research

Fall or spring. Variable credit. Prerequisite: doctoral students who have passed “A” exam; permission of instructor. S–U grades. Graduate faculty. For students admitted to candidacy **after** “A” exam has been passed.

PLANT PATHOLOGY AND PLANT-MICROBE BIOLOGY

G. W. Hudler, chair (331 Plant Science Bldg., 255-7848); S. V. Beer, G. C. Bergstrom, S. Cartinour, A. R. Collmer, W. E. Fry, S. M. Gray, K. T. Hodge, S. G. Lazarowitz, K. Lee, J. W. Lorbeer, R. Loria, G. B. Martin, M. T. McGrath, M. G. Milgroom, E. B. Nelson, R. J. Nelson, T. Pawlowska, K. L. Perry, B. G. Turgeon, X. Wang, T. A. Zitter

PLPA 1100 Symbiotic Associations in Nature

Fall or spring. 3 credits. Letter grades only. E. B. Nelson.

This course is a Freshman Writing Seminar where students will explore symbiotic biology and the nature of science and written scientific communication through discussions of a broad range of symbiotic relationships. Students will be exposed to a broad range of writing styles in scientific communication. Students will gain experience writing in a number of styles common in the biological

sciences. Additionally, students will learn to use evidentiary and inferential reasoning, articulate their thoughts and ideas through writing, make logical and systematic arguments, learn to revise their own writing, and effectively critique others’ writing content, organization, and style.

PLPA 1200 Evolution: Evaluating the Public Debate

Fall or spring. 3 credits. Letter grades only. R. Loria.

Though we live in a world infused with science and technology, most of the general public and a significant number of Cornell students do not believe in evolution. Evolution, the theory that organisms are connected by genealogy and change over time, is well supported and accepted as true by the scientific community. Nevertheless, there is an emotional debate outside scientific circles about the legitimacy of evolution as an explanation for the diversity of life on earth, and the existence of humans in particular. Readings will include books and articles that address the evidence for evolution. We will also analyze the writings of proponents of “Intelligent Design” and study descriptions of the controversy in the popular press, both current and historical.

PLPA 2010–2015 Magical Mushrooms, Mischievous Molds

Spring. 2 or 3 credits. S–U or letter grades. G. W. Hudler and B. G. Turgeon.

The Department of Plant Pathology and Plant-Microbe Biology offers several course options for students who want to learn about the kingdom FUNGI. All three courses (PLPA 2010, 2013, and 2015) have the same two-lecture-per-week core, and students wanting only the core should enroll in PLPA 2010 for 2 credits. Students interested in additional exposure to the FUNGI can enroll in PLPA 2013 or 2015 (each for 3 credits). See individual course descriptions below for more detail.

PLPA 2010 Magical Mushrooms, Mischievous Molds

Spring. 2 credits. S–U or letter grades. G. W. Hudler.

Presentation of the fungi and their roles in nature and in shaping past and present civilizations. Emphasizes the historical and practical significance of fungi as decayers of organic matter, as pathogens of plants and animals, as food, and as sources of mind-altering chemicals.

PLPA 2013 Mushrooms, Molds, and More

Spring. 3 credits. Fulfills 3 credits of introductory biology for non-life science majors. Limited to 24 students per sec.

Letter grades only. G. W. Hudler. Lectures and exams for this course are the same as those in PLPA 2010. However, students in PLPA 2013 will also participate in a weekly 55-minute discussion section where they will grow mushrooms and other fungi in culture, learn about contemporary classification of fungi, see examples of major taxa growing on natural substrates, and determine whether suspect pathogens really can kill agricultural crops. Students also teach their peers about the fungus world with presentations of their own creation. (CALS non-life science majors can receive college physical/life science distribution credits upon completion of this course but they must register for a letter grade.)

PLPA 2015 Mushrooms, Molds, and Molecules

Spring. 3 credits. Fulfills 3 credits of introductory biology for non-life science majors. Limited to 30 students per sec. Letter grades only. B. G. Turgeon.

Lectures and exams for this course are the same as those in PLPA 2010. However, students in PLPA 2015 will also participate in a weekly 55-minute discussion section to provide more in-depth exposure to some of the issues raised in 2010 lecture. Experts will emphasize that fungi produce myriads of molecules that are beneficial to other organisms (e.g., antibiotics, immunosuppressants, biocontrol agents) or to themselves (e.g., for development, reproduction, nutrient gathering, stress reduction), or detrimental to other organisms (e.g., toxins, poisons, allergens, hallucinogens). (CALS non-life science majors can receive college physical/life science distribution credits upon completion of this course but they must register for a letter grade.)

PLPA 3010 Biology and Management of Plant Diseases

Fall. 4 credits. Prerequisite: one year of biology. Letter grades only. W. E. Fry.

Introduction to the biology of the pathogens that cause plant diseases, and the diagnosis and management of plant diseases. Topics include the biology of bacteria, fungi, oomycetes, viruses, and nematodes; disease cycles, plant disease epidemiology, and the principles and practices of plant disease management. Intended for students who want a practical knowledge of plant diseases and their control, as well as for students preparing for advanced courses in plant pathology and plant-microbe biology.

[PLPA 3090 Fungi

Fall. 3 credits. Prerequisite: one year of biology. Recommended: concurrent enrollment in PLPA 3190. S-U or letter grades. K. T. Hodge.

A thorough introduction to the astounding kingdom of fungi, including mushrooms, molds, yeasts, athlete's foot, histoplasmosis, and the blue stuff in blue cheese. We cover fungal biodiversity, how fungi work, and their roles in the environment and in human affairs. Students work with living and preserved fungi and learn basic lab and identification skills.]

PLPA 3190 Mushrooms of Field and Forest

Fall, weeks 1-8. 2 credits. Letter grades only. K. T. Hodge.

Students learn to identify mushrooms and other macrofungi on a series of eight field trips to local forests. Mushrooms are collected during afternoon lab field trips. During the evening labs, students use keys and microscopes to identify mushrooms they've collected, and brief lectures introduce fungal ecology and diversity. Students must attend both lab times.

PLPA 3290 Medical and Veterinary Mycology (also VETMI 3290)

Spring. 2 credits. Prerequisite: introductory biology. Letter grades only. K. T. Hodge.

Introduction to fungi that cause human and animal disease. Lectures introduce topics including important fungi and the diseases they cause, which range from athlete's foot to equine guttural pouch aspergillosis. We cover the ecology and epidemiology of animal

pathogenic fungi, mycotoxins, mushroom poisoning, disease management, and clinical diagnosis.

[PLPA 3940 Circadian Rhythms (also ENTOM/BIOGD/BIONB 3940)

Fall. 2 credits; optional 3rd-credit lab.

Prerequisite: 2000-level biology. S-U or letter grades. K. Lee.

Explores a fundamental feature of living organisms from all kingdoms: how the cellular 24-hour biological clock operates and influences biological activities. Covers fundamental properties of biological rhythms and cellular and molecular structure of circadian oscillators in many organisms including cyanobacteria, fungi, insects, plants, reptiles, birds, and mammals (including humans.)

PLPA 4090 Principles of Virology (also VETMI/BIOMI 4090)

Fall. 3 credits. Prerequisites: BIOMI 2900, 2910 or permission of instructor.

Recommended: BIOBM 3300-3320, 4320.

Letter grades only. S. G. Lazarowitz, J. S. L. Parker, and N. Osterrieder.

For description, see VETMI 4090.

PLPA 4161 Microbes and Food: Contemporary Issues Affecting Humanity

Spring. 4 credits. Prerequisite: senior standing. S-U or letter grades. S. Beer.

Addresses the all-encompassing role that microbes play in contemporary life. How do microbes affect food production, processing, preservation, safety, and waste disposal? Assesses the role of microbes in industrial and environmental processing. Deals with origins of agriculture, GMOs, and high-input versus sustainable food production. Intense seminar/discussion format.

PLPA 4190 Agricultural Application of Plant Disease Concepts

Fall. 2 credits. Eight sessions. Prerequisite: PLPA 3010 and permission of instructor.

S-U or letter grades. H. S. Aldwinckle and B. Nault.

Addresses real-world problems in plant pathology and entomology through the application of research. Students tour fields of diverse fruit and vegetable field crops, a nursery, forests, and a golf course that have been impacted by diseases and arthropod pests. Strategies for managing diseases and pests based on research and the interface between Research and Extension are emphasized. **This course is taught at Geneva. Free transportation available.**

PLPA 4200 Grape Pest Management (also ENTOM/VIEN 4200)

Fall. 3 credits. Prerequisite: PLPA 3010, ENTOM 2410, or permission of instructors.

S-U or letter grades. W. Wilcox, G. Loeb, and A. Landers.

The course emphasizes general integrated pest management concepts, the biology and specific management practices pertaining to the major diseases and arthropod pests of grapes, and modern spray application technologies. Laboratories emphasize field illustrations of classroom concepts. Team taught by a plant pathologist, entomologist, and agricultural engineer.

PLPA 4330 Ecology of Infectious Diseases

Fall. 3 credits. Prerequisites: at least two semesters of introductory biology or equivalent. Letter grades only. E. Nelson. Introduction to the ecology of plant, animal, and human diseases. The course will emphasize a science-based approach for understanding the nature of disease development, the behavior of infectious agents and hosts, the ecological principles influencing disease emergence, transmission, and resurgence, and the general approaches to disease prediction, detection, and management.

[PLPA 4430 Pathology of Trees and Shrubs

Fall. 4 credits. Limited to 30 students.

Prerequisites: PLPA 3010 or equivalent.

S-U or letter grades. Offered even-

numbered years; next offered 2010-2011.

G. W. Hudler.

For students preparing for careers in horticulture, urban forestry, natural resources, and pest management. Deals with identification, impact, assessment, biology, and management of insects and diseases that damage trees and shrubs. Emphasizes pests of northeastern flora but examples from other parts of the country and the world are also used. Considers forest, shade, and ornamental plants.]

PLPA 4480 Evolution and Ecology of Symbiotic Associations (also BIOMI 4480)

Spring. 2 credits. Prerequisites: BIOG 1101-1102 or equivalent. Letter grades only. T. Pawlowska.

Symbiosis, a living together of two organisms in close associations, encompasses a spectrum of interactions ranging from mutually detrimental to mutually beneficial. We will focus on a selection of ecologically important symbiotic interactions, consider their evolutionary origins, and explore conditions that would favor their establishment and maintenance.

PLPA 4821-4822 Molecular Plant-Pathogen Interactions I and II (also BIOPL 4821-4822)

Spring, 4 weeks. 1 credit. Prerequisites: BIOGD 2810, BIOBM 3300 or 3310, and BIOPL 4831. A. R. Collmer and

B. G. Turgeon (odd years); S. G. Lazarowitz and G. B. Martin (even years).

Examines the molecular and cellular factors that control pathogen-plant interactions from the perspectives of pathogen biology and plant responses to pathogen infection. Beginning spring 2004, alternate years will focus on (1) plant perception of microbial pathogens and the interplay of plant defenses and pathogen counterstrategies that result in resistance or susceptibility to disease production, with topics including the genetic nature of dominant and recessive resistance, induction of pathogen defense genes, apoptotic responses that limit infection, and RNA interference; and (2) the genetic and molecular mechanisms of microbial pathogenesis, with an emphasis on fungal and bacterial virulence proteins, toxins, and their deployment systems.

PLPA 4823 Molecular Plant-Microbe Interactions (also BIOPL/BIOIM 4823)

Spring, weeks 1–4. 1 credit. Prerequisites: BIOGD 2810, BIOBM 3300 or 3310 or 3330, and BIOPL 483.1 or equivalents. S–U or letter grades. Offered even-numbered years. S. C. Winans.

For description, see BIOPL 4823.

PLPA 4831 Plant Molecular Biology I—Concepts and Techniques in Plant Molecular Biology (also BIOGD/BIOPL/PLBR 4831)

Fall, weeks 1–4. 2 credits. Prerequisites: BIOGD 2810, BIOBM 3300, or 3310. S–U or letter grades. M. Hanson, T. Owens, and M. Scanlon.

For description, see BIOPL 4831.

PLPA 4832 Proteomics and Protein Mass Spectrometry in Biology (also BIOPL/PLBR 4832)

Fall. 1 credit. Prerequisites: BIOGD 2810, BIOBM 3300 or 3320, or equivalent. Recommended: BIOBM 3310. S–U or letter grades. Offered alternate years. K. van Wijk.

For description, see BIOPL 4832.

PLPA 4940 Undergraduate Special Topics in Plant Pathology and Plant-Microbe Biology

Fall or spring. 4 credits max. S–U or letter grades. Staff.

The department teaches “trial” courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

PLPA 4970 Independent Study in Plant Pathology and Plant-Microbe Biology

Fall or spring. 1–5 credits. S–U or letter grades. Students must register using independent study form (available in 140 Roberts Hall).

An opportunity for independent study of a special topic in mycology or plant pathology under the direction of a faculty member.

PLPA 4980 Undergraduate Teaching Experience

Fall or spring. 1–5 credits. S–U or letter grades. Students must register using independent study form (available in 140 Roberts Hall).

Undergraduate teaching assistance in a mycology or plant pathology course by mutual agreement with the instructor.

PLPA 4990 Undergraduate Research

Fall or spring. 3–5 credits. S–U or letter grades. Students must register using independent study form (available in 140 Roberts Hall).

Opportunity for research experience under the direction of a faculty member.

PLPA 6010 Concepts of Plant Pathology and Plant-Microbe Biology

Spring. 3 credits. Prerequisite: PLPA 3010 or equivalent. S–U or letter grades. A. R. Collmer.

Concepts in plant-pathogen relationships uniting molecular and population biology approaches, with emphases on molecular/cellular investigations of model pathosystems and population biology studies integrating

host-pathogen evolution, genetics, and ecology. The discussion section is used for examining current research literature and other exercises complementary to lecture topics; emphasis is on critical thinking in science. Students prepare and review mock grant proposals.

PLPA 6020 Biology of Plant Pathogens

Spring. 3 credits. Prerequisite: PLPA 3010. S–U or letter grades. K. L. Perry and M. M. Milgroom.

Biology and ecology of four major groups of plant pathogens: fungi, bacteria, viruses, and oomycetes. Model plant pathogens are used to illustrate concepts of pathogen diversity, evolution, reproduction, life cycles, movement, diagnosis, and control. Lecture and laboratory topics are coordinated with PLPA 6010 to provide students with a comprehensive treatment of pathogen–host interactions at all levels from molecular to ecological. Laboratory periods are used for hands-on demonstration of pathogen diagnosis and manipulation or to discuss current literature relevant to lecture topics.

[PLPA 6080 Genomics of Bacterium–Host Interactions (also BIOIM 6080)]

Fall, weeks 2–5. 1 credit. Prerequisite: BIOIM 2900 or equivalent or permission of instructor. S–U or letter grades. Offered even-numbered years; next offered 2010–2011. A. Collmer, S. C. Winans, and D. Schneider.

Introduction to genomic approaches, tools, and discoveries involving the study of bacterial interactions with plant and animal hosts. Topics include the TIGR Comprehensive Microbial Resource and Artemis tools, the pathogens *Yersinia pestis*, *V. enterocolitica*, *Pseudomonas syringae*, *Ralstonia solanacearum*, and *Agrobacterium tumefaciens*, and the symbiont *Simorhizobium meliloti*.

[PLPA 6380 Filamentous Fungal Genomics and Development (also BIOGD 6380)]

Spring, weeks 9–12. 1 credit. Prerequisite: BIOGD 2810 or equivalent. S–U or letter grades. Offered odd-numbered years; next offered 2010–2011. B. G. Turgeon.

Molecular genetic and genomic approaches to the study of fungal biology. Applications of contemporary methodology to genetic dissection of developmental processes, such as pathogenesis and reproduction, are described and experimental data are evaluated. Examples are chosen from investigations of model plant pathogenic fungi such as *Cochliobolus heterostrophus*, *Fusarium graminearum*, *Magnaporthe grisea*, and *Ustilago maydis* and from well-known genetic models such as *Aspergillus nidulans* and *Neurospora crassa*.

PLPA 6420 Pathogen Population Biology

Fall. Prerequisite: permission of instructor. S–U grades only. M. G. Milgroom.

Weekly discussions of current topics in special areas of plant pathology and mycology. Students are required to do extensive reading of current literature and to present oral and written reports.

PLPA 6440 Current Topics in Oomycete Biology

Fall. Prerequisite: permission of instructor. S–U grades only. E. B. Nelson.

Weekly discussions of current topics in special areas of plant pathology and

mycology. Students are required to do extensive reading of current literature and to present oral and written reports.

PLPA 6450 Plant Virology

Fall. Prerequisite: permission of instructor. S–U grades only. S. M. Gray.

Weekly discussions of current topics in special areas of plant pathology and mycology. Students are required to do extensive reading of current literature and to present oral and written reports.

PLPA 6490 Fungal Biology

Spring. 1 credit. Recommended: some background in mycology or plant pathology. S–U grades only. K. T. Hodge and B. G. Turgeon.

Weekly meeting to discuss current scientific articles on the biology of fungi. Primarily directed at graduate students, but undergraduates, postdocs, staff, and guests who have an interest in fungi are welcome.

PLPA 6500 Diseases of Vegetable Crops

Fall. 1 credit. Prerequisite: permission of instructor. S–U grades only. J. W. Lorbeer and T. A. Zitter.

Weekly discussions of current topics in special areas of plant pathology and mycology. Students are required to do extensive reading of current literature and to present oral and written reports.

PLPA 6520 Field Crop Pathology

Spring. 1 credit. Prerequisite: permission of instructor. S–U grades only. W. G. C. Bergstrom.

Weekly discussions of current topics in special areas of plant pathology and mycology. Students are required to do extensive reading of current literature and to present oral and written reports.

PLPA 6600 Special Topics in Plant Disease Management

Fall and spring. 1 credit. S–U grades only. C. D. Smart.

Weekly discussions of current topics in plant disease management. These include not only management practices, but also factors that influence management strategies. Students are required to read current literature and present oral reports on a topic. **Offered only at the Geneva campus. Students provide their own transportation.**

PLPA 6610 Diagnostic Lab Experience

Fall and spring. 1 or 2 credits. Priority given to graduate students in plant pathology and plant protection. Recommended: course work or experience in diagnostic techniques. S–U grades only. Requires 3 hours per week per credit hour. T. A. Zitter.

For graduate students and advanced undergraduates with a special interest in diagnosing plant diseases. Students work in the Diagnostic Laboratory (plant pathology department) under supervision of the diagnostician.

PLPA 6810 Plant Pathology and Plant-Microbe Biology Seminar

Fall and spring. 1 credit. Requirement for all plant pathology and plant-microbe biology majors. S–U grades only. B. G. Turgeon.

PLPA 6820 Graduate Student Research Updates

Spring and fall. 1 credit. Requirement for all plant pathology and plant-microbe biology graduate students. S-U grades only. S. Cartinhour and H. Aldwinckle. Weekly graduate student seminar series. Guests with an interest in plant pathology research are welcome to attend. Classes meet simultaneously in Geneva and Ithaca and are linked by teleconference.

PLPA 6940 Graduate Special Topics in Plant Pathology and Plant-Microbe Biology

Fall or spring. 4 credits max. S-U or letter grades. Staff. The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

PLPA 7880 Research in Molecular Plant Pathology

Fall and spring. 2, 4, or 6 credits. Prerequisite: permission of instructor before beginning research. S-U grades only. S. V. Beer. Guided research experiences in laboratories addressing questions concerning the interaction of pathogens (bacteria, fungi, viruses) and plants at the molecular level. Intended for beginning graduate students with a concentration in molecular plant pathology and sufficient theoretical background and practical laboratory experience. Students submit plans and reports on each research experience.

PLPA 7970 Special Topics Independent Study

Fall or spring. 1-5 credits. S-U or letter grades. Staff. Opportunity for independent study of a special topic.

PLPA 7980 Graduate Teaching Experience

Fall or spring. 1-5 credits. S-U grades. Staff. Graduate teaching assistance in a mycology or plant pathology course by mutual agreement with the instructor. This experience may include, but is not limited to, preparing, assisting in, and teaching laboratories, preparing and delivering lectures, leading discussion sessions, and tutoring.

PLPA 7990 Graduate-Level Thesis Research

Fall or spring. Credit TBA. S-U or letter grades. Prerequisite: permission of advisor. Graduate faculty. For Ph.D. students who have not passed "A" exam.

PLPA 8900 Master's-Level Thesis Research

Fall or spring. Credit TBA. S-U or letter grades. Prerequisite: permission of advisor. Graduate faculty. For students working on a master's degree.

PLPA 9900 Doctoral-Level Thesis Research

Fall or spring. Credit TBA. S-U or letter grades. Prerequisite: permission of advisor. Graduate faculty. For Ph.D. candidates who have passed "A" exam.

SCIENCE OF NATURAL AND ENVIRONMENTAL SYSTEMS

B. Chabot, S. J. Colucci, J. Conrad, A. DiTommaso, L. Drinkwater, J. Elliot, G. W. Evans, T. J. Fahey, A. S. Flecker, C. C. Geisler, C. Goodale, C. J. Lehmann, E. L. Madsen, I. Merwin, E. B. Nelson, M. J. Pfeffer, G. P. Poe, J. Regenstein, S. J. Riha, C. W. Scherer, R. Schneider, W. D. Schulze, N. R. Scott, J. Thies, P. J. Trowbridge, M. F. Walter, M. T. Walter, D. W. Wolfe, J. B. Yavitt

SNES 1101 Intro to the Science and Management of Environmental and Natural Resources (also NTRES 1101)

Fall. 3 credits. Prerequisite: first-year students in Natural Resources, Science of Natural and Environment Systems, or other Environmental Undecided majors in CALS. J. Yavitt and E. Madsen. For description, see NTRES 1101.

SNES 2000 Environmental Sciences Colloquium

Fall. 1 credit. S-U grades only. S. Riha and J. Lehmann. This colloquium consists of a series of lectures on an annually changing theme central to the Environmental Sciences, which poses biophysical, economic, and political challenges to modern society. Participants will become familiar with contemporary issues of environmental degradation and opportunities for their mitigation. The colloquium is mandatory for SNES majors and is open to the public.

SNES 4960 Internships in Environmental Science

Fall, spring, summer. 1 credit; may be repeated once for a total of 2 credits. S-U grades only. Student internships involving on- or off-campus supervised, structured work experience. Member of SNES faculty must serve as mentor and complete the term grade report. All 4960 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

SNES 4970 Individual Studies in Environmental Sciences

Fall, spring, or summer. 1-6 credits, variable. S-U or letter grades. Individual studies are arranged under the supervision of one or several SNES faculty members. They provide opportunity to design a course that fills the need of an individual student and addresses pertinent issues in the environmental sciences.

STATISTICAL SCIENCE

The university-wide Department of Statistical Science coordinates undergraduate and graduate study in statistics and probability. A list of suitable courses can be found in the CIS section of this catalog.

VITICULTURE AND ENOLOGY

T. E. Acree, K. Arnink, T. Bates, P. Cousins, M. Goffinet, A. N. Lakso, A. Landers, G. English-Loeb, A. K. Mansfield, I. A. Merwin, R. Mira de Orduña, C. Owens, B. I. Reisch, G. Sacks, K. Siebert, J. Vanden Heuvel, W. Wilcox

VIEN 1104 Introduction to Wines and Vines (also FDSC/HORT 1104)

Spring. 3 credits. Lec (VIEN 1104) and lab (VIEN 1105) required for Viticulture and Enology majors. Letter grades only. K. Arnink and I. Merwin. For description, see FDSC 1104.

VIEN 1105 Lab/Field Practice in Wines and Vines (also FDSC/HORT 1105)

Spring. 1 credit. Limited to 30 students. Priority given to Viticulture and Enology majors. Prerequisite: concurrent or previous enrollment in VIEN 1104. Letter grades only. K. Arnink and I. Merwin. For description, see FDSC 1105.

VIEN 2400 Wines and Grapes: Composition and Analysis (also FDSC 2400)

Fall. 2 credits. Prerequisite: one semester of chemistry. Preference given to Enology and Viticulture and Food Science majors. Letter grades only. G. Sacks. For description, see FDSC 2400.

VIEN 3400 Microbiology and Technology of Winemaking (also FDSC 3400)

Fall. 3 credits. Prerequisite: introductory microbiology or permission of instructor. Priority given to Viticulture and Enology majors for whom lab is required. Letter grades only. K. Arnink. For description, see FDSC 3400.

VIEN 3410 Microbiology and Technology of Winemaking: Lab (also FDSC 3410)

Fall. 1 credit. Limited to 20 students; preference given to Viticulture and Enology majors. Prerequisite: permission of instructor. Letter grades only. K. Arnink. For description, see FDSC 3410.

VIEN 4200 Grape Pest Management (also PLPA/ENTOM 4200)

Fall. 3 credits. Prerequisites: PLPA 3010, ENTOM 2410, or permission of instructor. S-U or letter grades. W. Wilcox, G. Loeb, and A. Landers. For description, see PLPA 4200.

VIEN 4300 Understanding Wine and Beer (also FDSC 4300)

Spring. 3 credits. Prerequisites: introductory biology and chemistry or permission of instructor; age 21 by first day of class. S-U or letter grades. T. Acree and K. Siebert, G. Sacks, and R. Mira de Orduña. For description, see FDSC 4300.

VIEN 4400 Wine and Grape Flavor Development (also FDSC 4400)

Spring. 3 credits. Limited to 30 students. Required: at least one semester of general chemistry and one semester of organic chemistry. Prior course work in or knowledge of viticulture and enology recommended. FDSC 1104 and CHEM 2570. Letter grades only. G. Sacks.

For description, see FDSC 4400.

VIEN 4430 Viticulture and Vineyard Management I (also HORT 4430)

Fall. 3 credits. Prerequisites: any two-semester college biology course. Letter grades only. J. Vanden Huevel and P. Cousins.

For description, see HORT 4430.

VIEN 4440 Viticulture and Vineyard Management II (also HORT 4440)

Spring. 3 credits. Prerequisite or corequisite: HORT 4430 or permission of instructor. Letter grades only. J. Vanden Huevel.

For description, see HORT 4440.

VIEN 4444 Grapevine Biology (also HORT 4444)

Spring. 3 credits. Prerequisite: introductory botany; BIOPL 2420 or equivalent. Letter grades only. Offered odd-numbered years. A. N. Lakso, M. C. Goffinet, B. I. Reisch, P. S. Cousins, and C. L. Owens.

For description, see HORT 4444.

VIEN 4910 Viticulture and Enology Research Practices (also FDSC 4910)

Fall. 3 credits. Prerequisite: FDSC/HORT/VIEN 1105. Letter grades only. K. Arnink.

For description, see FDSC 4910.

VIEN 4960 Viticulture and Enology Internship

Fall, spring, summer. Variable credit. Prerequisite: VIEN/FDSC 1105. S–U grades only. K. Arnink and staff.

Internships provide experiential learning opportunities in real-life winery and vineyard circumstances where classroom knowledge is applied and evaluated. Students are able to master new skills, compare pilot-scale with commercial-scale winemaking practices, solve problems, interact in workplace situations, and build networks for future career opportunities. While working with industry mentors, students apply classroom knowledge, critical thinking, and self-directed learning skills to work effectively. Limit of 3 credits per internship and no more than 6 credits total for all internships. All 4960 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

VIEN 6450 Advanced Viticulture Topics (also HORT 6450)

Spring. 2 credits. Prerequisite: HORT 4430 or equivalent. Letter grades only. Offered even-numbered years. A. Lakso.

For description, see HORT 6450.

FACULTY ROSTER

Abawi, George S., Ph.D., Cornell U. Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
 Acree, Terry E., Ph.D., Cornell U. Prof., Food Science, and Technology (Geneva)

Adleman, Marvin I., M. L. A., Harvard U. Prof., Landscape Architecture
 Agnello, Arthur M., Ph.D., North Carolina State U. Prof., Entomology (Geneva)
 Ahner, Beth A., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Biological and Environmental Engineering
 Albright, Louis D., Ph.D., Cornell U. Prof., Biological and Environmental Engineering
 Aldwinckle, Herbert S., Ph.D., U. of London (England). Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
 Aneshansley, Daniel J., Ph.D., Cornell U. Prof., Biological and Environmental Engineering
 Angenent, Largus T., Ph.D., Iowa State U. Assoc. Prof., Biological and Environmental Engineering
 Austic, Richard E., Ph.D., U. of California, Davis. Prof., Animal Science
 Baeumner, Antje J., Ph.D., U. of Stuttgart (Germany). Prof., Biological and Environmental Engineering
 Bain, Mark B., Ph.D., U. of Massachusetts. Assoc. Prof., Natural Resources
 Barbano, David M., Ph.D., Cornell U. Prof., Food Science
 Barrett, Christopher B., Ph.D., U. of Wisconsin. Prof., Applied Economics and Management
 Bartsch, James A., Ph.D., Purdue U. Assoc. Prof., Biological and Environmental Engineering
 Bassuk, Nina L. Ph.D., U. of London (England). Prof., Horticulture
 Basu, Alaka, M.S., U. of London (UK). Prof., Development Sociology
 Batt, Carl A., Ph.D., Rutgers U. Prof., Food Science
 Baugher, Sherene, Ph.D., SUNY, Stonybrook. Assoc. Prof., Landscape Architecture
 Bauman, Dale E., Ph.D., U. of Illinois. Prof., Animal Science
 Bauerle, Taryn L., Ph.D., Pennsylvania State U. Asst. Prof., Horticulture
 Beer, Steven V., Ph.D., U. of California, Davis. Prof., Plant Pathology and Plant-Microbe Biology
 Bellinder, Robin R., Ph.D., Virginia Polytechnic Inst. and State U. Prof., Horticulture
 Bento, Antonio, Ph.D., U. of Maryland. Assoc. Prof., Applied Economics and Management
 Bergstrom, Gary C., Ph.D., U. of Kentucky. Prof., Plant Pathology and Plant-Microbe Biology
 Bills, Nelson L., Ph.D., Washington State U. Prof., Applied Economics and Management
 Birnholtz, Jeremy P., Ph.D., U. of Michigan. Asst. Prof., Communication
 Bjorkman, Thomas N., Ph.D., Cornell U. Assoc. Prof., Horticultural Sciences (Geneva)
 Blalock, Garrick, Ph.D., U. of California, Berkeley. Asst. Prof., Applied Economics and Management
 Blosssey, Bernd, Ph.D., Christian-Albrechts U. (Germany). Assoc. Prof., Natural Resources
 Bogan, Vicki L., Ph.D., Brown U. Asst. Prof., Applied Economics and Management
 Boisclair, Yves R., Ph.D., Cornell U. Prof., Animal Science
 Boisvert, Richard N., Ph.D., U. of Minnesota. Prof., Applied Economics and Management
 Boor, Kathryn J., Ph.D., U. of California, Davis. Prof., Food Science
 Booth, James, Ph.D., U. of Kentucky. Prof., Biological Statistics and Computational Biology

Brady, John W., Jr., Ph.D., SUNY, Stonybrook. Prof., Food Science
 Bridgen, Mark P., Ph.D., Virginia Polytechnic Inst. and State U. Prof. and director, LIHR and EC, Horticulture
 Brooks, Samantha A., Ph.D., U. of Kentucky. Asst. Prof., Animal Science
 Broussard, Shorna R., Ph.D., Oregon State U. Assoc. Prof., Natural Resources
 Brown, Dan L., Ph.D., Cornell U. Assoc. Prof., Animal Science
 Brown, David L., Ph.D., U. of Wisconsin. Professor, Development Sociology
 Brown, Susan K., Ph.D., U. of California, Davis. Prof., Horticultural Sciences (Geneva)
 Buckley, Daniel H., Ph.D., Michigan State U. Asst. Prof., Crop and Soil Sciences
 Burr, Thomas J., Ph.D., U. of California, Berkeley. Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
 Bustamante, Carlos D., Ph.D., Harvard U. Prof., Biological Statistics and Computational Biology
 Butler, Walter R., Ph.D., Purdue U. Prof. and Chair, Animal Science
 Byrne, Sahara E., Ph.D., U. of California, Santa Barbara. Asst. Prof., Communication
 Caffarella, Rosemary S., Ph.D., Michigan State U. Prof., Education
 Calderone, Nicholas W., Ph.D., Ohio State U. Assoc. Prof., Entomology
 Camp, William G., Ph.D., Georgia State U. Prof., Education
 Cartinhour, Samuel W., Ph.D., U. of Utah. Courtesy Prof., Plant Pathology and Plant-Microbe Biology
 Chapman, Lewis D., Ph.D., U. of California, Berkeley. Prof., Applied Economics and Management
 Chase, Larry E., Ph.D., Pennsylvania State U. Prof., Animal Science
 Chau, Ho Yan, Ph.D., Johns Hopkins U. Assoc. Prof., Applied Economics and Management
 Cheng, Lailiang, Ph.D., Oregon State U. Assoc. Prof., Horticulture
 Cherney, Debbie J., U. of Florida. Prof., Animal Science
 Cherney, Jerome H., Ph.D., U. of Minnesota. Prof., Crop and Soil Sciences
 Christy, Ralph D., Ph.D., Michigan State U. Prof., Applied Economics and Management
 Coffman, W. Ronnie, Ph.D., Cornell U. Prof., Plant Breeding
 Collmer, Alan R., Ph.D., Cornell U. Prof., Plant Pathology and Plant-Microbe Biology
 Colucci, Stephen J., Ph.D., SUNY, Albany. Prof., Earth and Atmospheric Sciences
 Conrad, Jon M., Ph.D., U. of Wisconsin. Prof., Applied Economics and Management
 Constat, Mark A., Ph.D., Cornell U. Assoc. Prof., Education
 Cooch, Evan G., Ph.D., Queen's U. (Canada). Assoc. Prof., Natural Resources
 Cooke, J. Robert, Ph.D., North Carolina State U. Prof. Emeritus, Biological and Environmental Engineering
 Cox, Kerik D., Ph.D., U. of Georgia. Asst. Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
 Cox, William J., Ph.D., Oregon State U. Prof., Crop and Soil Sciences
 Crawford, Barbara A., Ph.D., U. of Michigan. Assoc. Prof., Education
 Currie, W. Bruce, Ph.D., Macquarie U. (Australia). Prof., Animal Science
 Curtis, Paul D., Ph.D., North Carolina State U. Assoc. Prof., Natural Resources

- Danforth, Bryan N., Ph.D., U. of Kansas. Prof., Entomology
- Daouk, Hazem, Ph.D., Indiana U. Assoc. Prof., Applied Economics and Management
- Datta, Ashim K., Ph.D., U. of Florida. Prof., Biological and Environmental Engineering
- Decker, Daniel J., Ph.D., Cornell U. Prof., Natural Resources
- DeGaetano, Arthur, Ph.D., Rutgers U. Assoc. Prof., Earth and Atmospheric Sciences
- DeGloria, Stephen D., Ph.D., U. of California, Berkeley. Prof., Crop and Soil Sciences
- de Gorter, Harry, Ph.D., U. of California, Berkeley. Assoc. Prof., Applied Economics and Management
- DeJong, Walter S., Ph.D., U. of Wisconsin. Asst. Prof., Plant Breeding
- DeVault, Travis, Ph.D., Purdue U. Adj. Prof., Natural Resources
- Dickinson, Janis L., Ph.D., Cornell U. Assoc. Prof., Natural Resources
- Dillard, Helene R., Ph.D., U. of California, Davis. Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
- DiTommaso, Antonio, Ph.D., McGill U. (Canada). Assoc. Prof., Crop and Soil Sciences
- Dong, Shikui, Ph.D., Gansu Agric. U. (China). Adj. Prof., Natural Resources
- Douglas, Angela, Ph.D., U. of Aberdeen (Scotland). Prof., Entomology
- Drinkwater, Laurie, Ph.D., U. of California, Davis. Assoc. Prof., Horticulture
- Duxbury, John M., Ph.D., U. of Birmingham (England). Prof., Crop and Soil Sciences
- Earle, Elizabeth D., Ph.D., Harvard U. Prof., Plant Breeding
- Eloundou-Enyegue, Parfait M., Ph.D., Pennsylvania State U. Assoc. Prof., Development Sociology
- Fahey, Timothy J., Ph.D., U. of Wyoming. Prof., Natural Resources
- Feldman, Shelley, Ph.D., U. of Connecticut. Prof., Development Sociology
- Fick, Gary W., Ph.D., U. of California, Davis. Prof., Crop and Soil Sciences
- Fisher, William L., Ph.D., U. of Louisville (Kentucky). Courtesy Assoc. Prof., Natural Resources
- Forney, John, Ph.D., Cornell U. Adj. Prof., Natural Resources
- Forsline, Philip L., M.S., U. of Minnesota. Courtesy Asst. Prof., Horticultural Sciences (Geneva)
- Francis, Joe D., Ph.D., U. of Missouri. Assoc. Prof., Development Sociology
- Fry, William E., Ph.D., Cornell U. Prof., Plant Pathology and Plant-Microbe Biology
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- Galton, David M., Ph.D., Ohio State U. Prof., Animal Science
- Gan, Susheng, Ph.D., U. of Wisconsin. Assoc. Prof., Horticulture
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- Gay, Geraldine K., Ph.D., Cornell U. Prof., Communication
- Gebremedhin, Kifle G., Ph.D., U. of Wisconsin. Prof., Biological and Environmental Engineering
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- Gilbert, Cole, Ph.D. U. of Kansas. Assoc. Prof., Entomology
- Gillespie, Tarleton L., Ph.D., U. of California, San Diego. Asst. Prof., Communication
- Gleason, Kathryn L., Ph.D., Oxford U. (UK). Assoc. Prof., Landscape Architecture
- Gloy, Brent A., Ph.D., Purdue U. Assoc. Prof., Applied Economics and Management
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- Hajek, Ann E., Ph.D., U. of California, Berkeley. Prof., Entomology
- Halseth, Donald E., Ph.D., Cornell U. Assoc. Prof., Horticulture
- Hancock, Jeffrey T., Ph.D., Dalhousie U. (Canada) Assoc. Prof., Communication
- Hang, Yong D., Ph.D., McGill U. (Canada). Prof., Food Science and Technology (Geneva)
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- Hess, Peter G., Ph.D., U. of Washington. Assoc. Prof., Biological and Environmental Engineering
- Hirschl, Thomas A., Ph.D., U. of Wisconsin. Prof., Development Sociology
- Hoch, Harvey C., Ph.D., U. of Wisconsin, Madison. Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
- Hodge, Kathie, Ph.D., Cornell U. Asst. Prof., Plant Pathology and Plant-Microbe Biology
- Hoffmann, Michael P., Ph.D., U. of California, Davis. Prof., Entomology
- Hooker, Giles J., Ph.D., Stanford U. Asst. Prof., Biological Statistics and Computational Biology
- Horrigan, Paula H., M.L.A., Cornell U. Assoc. Prof., Landscape Architecture
- Hotchkiss, Joseph H., Ph.D., Oregon State U. Prof., Food Science
- Hudler, George W., Ph.D., Colorado State U. Prof., Plant Pathology and Plant-Microbe Biology
- Hullar, Theodore L., Ph.D., U. of Minnesota. Prof., Natural Resources
- Humphreys, Lee M., Ph.D., U. of Pennsylvania. Asst. Prof., Communication
- Hunter, Jean B., D.En.Sc., Columbia U. Assoc. Prof., Biological and Environmental Engineering
- Imumorin, Ikhide G., Ph.D., Texas A&M U. Asst. Prof., Animal Science
- Irwin, Lynne H., Ph.D., Texas A&M U. Assoc. Prof., Biological and Environmental Engineering
- Jewell, William J., Ph.D., Stanford U. Prof. Emeritus, Biological and Environmental Engineering
- Johnson, Patricia A., Ph.D., Cornell U. Prof., Animal Science
- Just, David R., Ph.D., U. of California, Berkeley. Asst. Prof., Applied Economics and Management
- Kaiser, Harry M., Ph.D., U. of Minnesota. Prof., Applied Economics and Management
- Kanbur, Sanjiv Madhwarao, Ph.D., U. of Oxford (UK). Prof., Applied Economics and Management
- Kassam, Karim-Aly, Ph.D., Cornell U. Assoc. Prof., Natural Resources
- Ketterings, Quirine, Ph.D., Ohio State. Assoc. Prof., Animal Science
- Knipple, Douglas C., Ph.D., Cornell U. Assoc. Prof., Entomology (Geneva)
- Knoblauch, Wayne A., Ph.D., Michigan State U. Prof., Applied Economics and Management
- Knuth, Barbara A., Ph.D., Virginia Tech. Senior Assoc. Dean and Prof., Natural Resources
- Kochian, Leon V., Ph.D., U. of California, Davis. Courtesy Prof., Crop and Soil Sciences
- Koeller, Wolfram D., Ph.D., Phillips U.-Marburg (Germany). Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
- Kraft, Clifford E., Ph.D., U. of Wisconsin, Madison. Assoc. Prof., Natural Resources
- Krall, Daniel W., M.L.A. Cornell U. Assoc. Prof., Landscape Architecture
- Krasny, Marianne E., Ph.D., U. of Washington. Prof., Natural Resources
- Kresovich, Stephen, Ph.D., Ohio State U. Prof., Plant Breeding
- Kyle, Steven C., Ph.D., Harvard U. Assoc. Prof., Applied Economics and Management
- LaBastille, Anne, Ph.D., Cornell U. Adj. Prof., Natural Resources
- Lakso, Alan N., Ph.D., U. of California, Davis. Prof., Horticultural Sciences (Geneva)
- Lassoie, James P., Ph.D., U. of Washington. Prof., Natural Resources
- Lawless, Harry T., Ph.D., Brown U. Prof., Food Science
- Lazarowitz, Sondra G., Ph.D., Rockefeller U. Prof., Plant Pathology and Plant-Microbe Biology
- Lazzaro, Brian, Ph.D., Pennsylvania State U. Assoc. Prof., Entomology
- Lee, Chang Y., Ph.D., Utah State U. Prof., Food Science and Technology (Geneva)
- Lee, David R., Ph.D., U. of Wisconsin, Madison. Prof., Applied Economics and Management
- Lee, Kwangwon, Ph.D., Texas A&M U. Asst. Prof., Plant Pathology and Plant-Microbe Biology
- Lehmann, C. Johannes, Ph.D., U. of Bayreuth (Germany). Assoc. Prof., Crop and Soil Sciences
- Lei, Xingen, Ph.D., Michigan State U. Prof., Animal Science
- Leiponen, Aija, Ph.D., U. of California, Berkeley. Asst. Prof., Applied Economics and Management
- Lesser, William H., Ph.D., U. of Wisconsin, Madison. Prof., Applied Economics and Management
- Levine, Gilbert, Ph.D., Cornell U. Prof. Emeritus, Biological and Environmental Engineering
- Lewenstein, Bruce V., Ph.D., U. of Pennsylvania. Prof., Communication

- Liebherr, James K., Ph.D., U. of California, Berkeley. Prof., Entomology
- Liu, Ruihai, Ph.D., Cornell U. Assoc. Prof., Food Science
- Loeb, Gregory M., Ph.D., U. of California, Davis. Assoc. Prof., Entomology (Geneva)
- Lohman, Rowena B., Ph.D., California Inst. of Technology. Asst. Prof., Earth and Atmospheric Sciences
- Long, Qiaoming, Ph.D., U. of Edinburgh (Scotland). Asst. Prof., Animal Science
- Lorbeer, James W., Ph.D., U. of California, Berkeley. Prof., Plant Pathology and Plant-Microbe Biology
- Loria, Rosemary, Ph.D., Michigan State U. Prof., Plant Pathology and Plant-Microbe Biology
- Lossy, John E., Ph.D., U. of Maryland. Assoc. Prof., Entomology
- Lovette, J. Irby, Ph.D., U. of Pennsylvania. Asst. Prof., Ornithology
- Luo, Dan, Ph.D., Ohio State U. Assoc. Prof., Biological and Environmental Engineering
- Mahowald, Natalie, Ph.D., Massachusetts Institute of Technology. Assoc. Prof., Earth and Atmospheric Sciences
- Makki, Fouad M., Ph.D., Binghamton U. Asst. Prof., Development Sociology
- Mansfield, Anna K., Ph.D., U. of Minnesota. Asst. Prof., Food Science and Technology (Geneva)
- March, John C., Ph.D., U. of Maryland. Asst. Prof., Biological and Environmental Engineering
- Martin, Gregory B., Ph.D., Michigan State U. Prof., Plant Pathology and Plant-Microbe Biology
- Mattson, Neil S., Ph.D., U. of California, Davis. Asst. Prof., Horticulture
- McBride, Murray B., Ph.D., Michigan State U. Prof., Crop and Soil Sciences
- McComas, Katherine A., Ph.D., Cornell U. Assoc. Prof., Communication
- McCouch, Susan, Ph.D., Cornell U. Prof., Plant Breeding
- McGrath, Margaret T., Ph.D., Pennsylvania State U. Assoc. Prof., Plant Pathology and Plant-Microbe Biology
- McLaughlin, Edward W., Ph.D., Michigan State U. Prof., Applied Economics and Management
- McLeod, Poppy L., Ph.D., Harvard U. Assoc. Prof., Communication
- McMichael, Philip D., Ph.D., SUNY, Binghamton. Prof., Development Sociology
- Meloy, Margaret G., Ph.D., Cornell U. Adj. Asst. Prof., Applied Economics and Management
- Merwin, Ian A., Ph.D., Cornell U. Prof., Horticulture
- Mezey, Jason G., Ph.D., Yale U. Asst. Prof., Biological Statistics and Computational Biology
- Milgroom, Michael G., Ph.D., Cornell U. Prof., Plant Pathology and Plant-Microbe Biology
- Miller, Dennis D., Ph.D., Cornell U. Prof., Food Science
- Miller, William B., Ph.D., Cornell U. Prof., Horticulture
- Mira de Orduña Heidinger, Ramon, Ph.D., Massey U. (New Zealand). Assoc. Prof., Food Science and Technology
- Mize, Ronald L., Ph.D., U. of Wisconsin, Madison. Asst. Prof., Development Sociology
- Moraru, Carmen I., Ph.D., U. of Galati (Romania). Asst. Prof., Food Science
- Mount, Timothy D., Ph.D., U. of California, Berkeley. Prof., Applied Economics and Management
- Mt. Pleasant, Jane, Ph.D., North Carolina State U. Assoc. Prof., Horticulture
- Mudge, Kenneth W., Ph.D., Washington State U. Assoc. Prof., Horticulture
- Mulvaney, Steven J., Ph.D., Cornell U. Assoc. Prof., Food Science
- Mutschler, Martha A., Ph.D., U. of Wisconsin. Prof., Plant Breeding
- Nault, Brian, Ph.D., North Carolina State. Assoc. Prof., Entomology (Geneva)
- Nelson, Eric B., Ph.D., Ohio State U. Prof., Plant Pathology and Plant-Microbe Biology
- Nelson, Rebecca J., Ph.D., U. of Washington. Assoc. Prof., Plant Pathology and Plant-Microbe Biology
- Ng, David T., Ph.D., Columbia U. Assoc. Prof., Applied Economics and Management
- Niederdeppe, Jeffrey D., Ph.D., U. of Pennsylvania. Asst. Prof., Communication
- Nielsen, Rasmus, Ph.D., U. of California, Berkeley. Adjunct Prof., Biological Statistics and Computational Biology
- Novakovic, Andrew M., Ph.D., Purdue U. Prof., Applied Economics and Management
- Nyrop, Jan P., Ph.D., Michigan State U. Prof., Entomology
- Obendorf, Ralph L., Ph.D., U. of California, Davis. Prof., Crop and Soil Sciences
- Okigbo, Amaechi R., M.L.A., Cornell U. Assoc. Prof., Landscape Architecture
- Overton, Thomas R., Ph.D., U. of Illinois. Assoc. Prof., Animal Science
- Padilla-Zakour, Olga, Ph.D., Cornell U. Assoc. Prof., Food Science and Technology (Geneva)
- Park, Travis D., Ph.D., U. of Florida. Asst. Prof., Education
- Parks, John E., Ph.D., Virginia Polytechnic Inst. and State U. Prof., Animal Science
- Parlange, Jean-Yves, Ph.D., Brown U. Prof., Biological and Environmental Engineering
- Pawlowska, Teresa E., Ph.D., U. of Minnesota. Asst. Prof., Plant Pathology and Plant-Microbe Biology
- Pawlowski, Wojtek P., Ph.D., U. of Minnesota. Asst. Prof., Plant Breeding
- Peck, Daniel C., Ph.D., Cornell U. Asst. Prof., Entomology (Geneva)
- Pell, Alice N., Ph.D., U. of Vermont. Prof., Animal Science
- Perry, Keith, Ph.D., Cornell U. Assoc. Prof., Plant Pathology and Plant-Microbe Biology
- Peters, Scott J., Ph.D., U. of Minnesota. Assoc. Prof., Education
- Petrovic, A. Martin, Ph.D., Michigan State U. Prof., Horticulture
- Pfeffer, Max, Ph.D., U. of Wisconsin, Madison. Prof., Development Sociology
- Pimentel, David, Ph.D., Cornell U. Prof. Emeritus, Entomology
- Pinstrup-Andersen, Per, Ph.D., Oklahoma State U. Prof., Applied Economics and Management
- Poe, Gregory, Ph.D., U. of Wisconsin. Assoc. Prof., Applied Economics and Management
- Pollak, E. John, Ph.D., Iowa State U. Prof., Animal Science
- Prasad, Eswar, Ph.D., U. of Chicago. Prof., Applied Economics and Management
- Prince, Jeffrey T., Ph.D., Northwestern U. Asst. Prof., Applied Economics and Management
- Pritts, Marvin P., Ph.D., Michigan State U. Prof., Horticulture
- Quaas, Richard L., Ph.D., Colorado State U. Prof., Animal Science
- Quirk, Susan M., Ph.D., Cornell U. Assoc. Prof., Animal Science
- Raj, Sevillmedu P., Ph.D., Carnegie-Mellon U. Prof., Applied Economics and Management
- Rakow, Donald A., Ph.D., Cornell U. Assoc. Prof., Horticulture
- Raman, Kandukuri, Ph.D., U. of Reading (England). Sr. Res. Assoc., Plant Breeding
- Rangarajan, Anusuya, Ph.D., Ohio State U. Assoc. Prof., Horticulture
- Ranney, Christine K., Ph.D., U. of California, Davis. Assoc. Prof., Applied Economics and Management
- Rayor, Linda, Ph.D., U. of Kansas. Sr. Res. Assoc., Entomology
- Regenstein, Joe M., Ph.D., Brandeis U. Prof., Food Science
- Rehkugler, Gerald E., Ph.D., Cornell U. Prof. Emeritus, Biological and Environmental Engineering
- Reiners, Stephen, Ph.D., Ohio State U. Assoc. Prof., Horticultural Sciences (Geneva)
- Reisch, Bruce, Ph.D., U. of Wisconsin, Madison. Prof., Horticultural Sciences (Geneva)
- Reissig, William H., Ph.D., Oregon State U. Prof., Entomology (Geneva)
- Richardson, Troy, Ph.D., U. of Utah. Asst. Prof., Education
- Riha, Susan, Ph.D., Washington State U. Prof., Earth and Atmospheric Sciences
- Rizvi, Syed S., Ph.D., Ohio State U. Prof., Food Science
- Robinson, Terence L., Ph.D., Washington State U. Assoc. Prof., Horticultural Sciences (Geneva)
- Roelofs, Wendell L., Ph.D., Indiana U. Prof., Entomology (Geneva)
- Rose, Jocelyn, Ph.D., U. of California, Davis. Asst. Prof., Plant Biology
- Rosenberger, David A., Ph.D., Michigan State U. Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
- Rossi, Frank S., Ph.D., Cornell U. Assoc. Prof., Horticulture
- Rudstam, Lars G., Ph.D., U. of Stockholm (Sweden). Assoc. Prof., Natural Resources
- Ruggeri, Deni, M.L.A., M.R.P., Cornell U. Asst. Prof., Landscape Architecture
- Rutz, Donald A., Ph.D., North Carolina State U. Prof., Entomology
- Sacks, Gavin L., Ph.D., Cornell U. Asst. Prof., Food Science and Technology
- Sanderson, John P., Ph.D., U. of California, Riverside. Assoc. Prof., Entomology
- Sanford, John C., Ph.D., U. of Wisconsin, Madison. Courtesy Assoc. Prof., Horticultural Sciences (Geneva)
- Scanlon, Michael J., Ph.D., Iowa State U. Assoc. Prof., Plant Biology
- Scherer, Clifford W., Ph.D., U. of Wisconsin, Madison. Assoc. Prof., Communication
- Schmit, Todd, Ph.D., Cornell U. Asst. Prof., Applied Economics and Management
- Schneider, Rebecca, Ph.D., Cornell U. Assoc. Prof., Natural Resources
- Schrader, Dawn E., Ph.D., Harvard U. Assoc. Prof., Education
- Schulze, William D., Ph.D., U. of California, Riverside. Prof., Applied Economics and Management
- Schwager, Steven J., Ph.D., Yale U. Assoc. Prof., Biological Statistics and Computational Biology
- Scott, Jeffrey G., Ph.D., U. of California, Berkeley. Prof., Entomology
- Scott, Norman R., Ph.D., Cornell U. Prof., Biological and Environmental Engineering
- Seem, Robert C., Ph.D., Pennsylvania State U. Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
- Setter, Timothy L., Ph.D., U. of Minnesota. Prof., Crop and Soil Sciences

- Shapiro, Michael A., Ph.D., U. of Wisconsin, Madison. Assoc. Prof., Communication
- Shelton, Anthony M., Ph.D., U. of California, Riverside. Prof., Entomology (Geneva)
- Shields, Elson J., Ph.D., U. of Wisconsin. Prof., Entomology
- Siebert, Karl J., Ph.D., Pennsylvania State U. Prof., Food Science and Technology (Geneva)
- Siepel, Adam C., Ph.D., U. of California, Santa Cruz. Asst. Prof., Biological Statistics and Computational Biology
- Simon, Daniel, Ph.D., U. of Maryland. Asst. Prof., Applied Economics and Management
- Supple, John W., Ph.D., U. of Michigan. Assoc. Prof., Education
- Smart, Christine D., Ph.D., Michigan State U. Asst. Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
- Smith Einarson, Margaret E., Ph.D., Cornell U. Assoc. Prof., Plant Breeding
- Smith, R. David, Ph.D., Cornell U. Assoc. Prof., Animal Science
- Soderlund, David M., Ph.D., U. of California, Berkeley. Prof., Entomology (Geneva)
- Sorrells, Mark E., Ph.D., U. of Wisconsin, Madison. Prof., Plant Breeding
- Spanswick, Roger M., Ph.D., U. of Edinburgh (Scotland). Prof., Biological and Environmental Engineering
- Spencer, James W., Ph.D., Stanford U. Prof. Emeritus, Biological and Environmental Engineering
- Stedman, Richard C., Ph.D., U. of Wisconsin. Asst. Prof., Natural Resources
- Steenhuis, Tammo S., Ph.D., U. of Wisconsin. Prof., Biological and Environmental Engineering
- Strawderman, Robert L., Ph.D., Harvard U. Prof., Biological Statistics and Computational Biology
- Streeter, Deborah H., Ph.D., U. of Wisconsin, Madison. Prof., Applied Economics and Management
- Sullivan, Patrick J., Ph.D., U. of Washington. Assoc. Prof., Natural Resources
- Tanksley, Steven D. Ph.D., U. of California, Davis. Prof., Plant Breeding
- Tauer, Loren W., Ph.D., Iowa State U. Prof., Applied Economics and Management
- Taylor, Alan G., Ph.D., Oklahoma State U. Prof., Horticultural Sciences (Geneva)
- Thaler, Jennifer S., Ph.D., U. of California, Davis. Assoc. Prof., Entomology
- Thies, Janice E., Ph.D., U. of Hawaii. Prof., Crop and Soil Sciences
- Thonney, Michael L., Ph.D., U. of Minnesota. Prof., Animal Science
- Timmons, Michael B., Ph.D., Cornell U. Prof., Biological and Environmental Engineering
- Tingey, Ward M., Ph.D., U. of Arizona. Prof., Entomology
- Trancik, Roger T., M.L.A., Harvard U. Prof., Landscape Architecture
- Trowbridge, Peter J., M.L.A., Harvard U. Prof., Landscape Architecture
- Trumbull, Deborah J., Ph.D., U. of Illinois. Prof., Education
- Turgeon, B. Gillian, Ph.D., U. of Dayton. Prof., Plant Pathology and Plant-Microbe Biology
- Turvey, Calum G., Ph.D., Purdue U. Prof., Applied Economics and Management
- VanAmburgh, Michael E., Ph.D., Cornell U. Assoc. Prof., Animal Science
- Vanden Heuvel, Justine E., Ph.D., U. of Guelph (Canada). Asst. Prof., Horticultural Sciences
- vanEs, Harold M., Ph.D., North Carolina State U. Prof. and Chair, Crop and Soil Sciences
- Vatamaniuk, Olena K., Ph.D., U. of Kyiv (Ukraine). Asst. Prof., Crop and Soil Sciences
- Viands, Donald R., Ph.D., U. of Minnesota. Prof., Plant Breeding
- Villenas, Sofia A., Ph.D., U. of North Carolina, Chapel Hill. Assoc. Prof., Education
- Walker, Larry P., Ph.D., Michigan State U. Prof., Biological and Environmental Engineering
- Walter, Michael F., Ph.D., U. of Wisconsin, Madison. Prof., Biological and Environmental Engineering
- Walter, M. Todd, Ph.D., Washington State U. Asst. Prof., Biological and Environmental Engineering
- Wang, Ping, Ph.D., Cornell U. Assoc. Prof., Entomology (Geneva)
- Wang, Xiaohong, Ph.D., Chinese Acad. of Sci. Courtesy Asst. Prof., Plant Pathology and Plant-Microbe Biology
- Wansink, Brian C., Ph.D., Stanford U. Prof., Applied Economics and Management
- Watkins, Christopher B., Rutgers U. Prof., Horticulture
- Weber, Courtney A., Ph.D., U. of Florida. Assoc. Prof., Horticultural Sciences (Geneva)
- Welch, Ross M., Ph.D., U. of California. Courtesy Prof., Crop and Soil Sciences
- Whitlow, Thomas H., Ph.D., U. of California, Davis. Assoc. Prof., Horticulture
- Wiedmann, Martin, Ph.D., Cornell U. Assoc. Prof., Food Science
- Wien, Hans C., Ph.D., Cornell U. Prof., Horticulture
- Wilcox, Wayne F., Ph.D., U. of California, Davis. Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
- Wilks, Daniel S., Ph.D., Oregon State U. Prof., Earth and Atmospheric Sciences
- Williams, Linda, Ph.D., Brown U. Prof., Development Sociology
- Wilson, Arthur L., Ph.D., U. of Georgia. Prof., Education
- Wolf, Steven, Ph.D., U. of Wisconsin, Madison. Assoc. Prof., Natural Resources
- Wolfe, David W., Ph.D., U. of California, Davis. Prof., Horticulture
- Worobo, Randy W., Ph.D., U. of Alberta (Canada). Assoc. Prof., Food Science and Technology (Geneva)
- Yavitt, Joseph B., Ph.D., U. of Wyoming. Assoc. Prof., Natural Resources
- Yuan, Yu (Connie), Ph.D., U. of Southern California, Los Angeles. Asst. Prof., Communication
- Zitter, Thomas A., Ph.D., Michigan State U. Prof., Plant Pathology and Plant-Microbe Biology

COLLEGE OF ARCHITECTURE, ART, AND PLANNING

ADMINISTRATION

Kent Kleinman, dean

Barry Perlus, associate dean

Peter Turner, assistant dean of administration and finance

to be announced, chair, Department of Architecture

Patricia C. Phillips, chair, Department of Art

Kieran Donaghy, chair, Department of City and Regional Planning

Deborah Durnam, director, admissions

Michael Moyer, director, alumni affairs and development

M. Susan Lewis, director, career services

Melanie Holland Bell, registrar

FACULTY ADVISORS

Architecture students are assigned faculty advisors and are also invited to share concerns with and seek advice from the most appropriate faculty member or college officer, including the registrar, the department chair, and the dean.

Students in the fine arts department are assigned a faculty advisor for the first year. After the first year, students may select their advisors. Students are required to have an advisor throughout their program in their area of concentration.

Undergraduate students in the program of Urban and Regional Studies are assigned faculty advisors.

All students in the college are invited to share concerns and seek advice from the volunteer student advisors (EARS) at any time.

DEGREE PROGRAMS

	<i>Degree</i>
Architecture	B.Arch.
	B.F.A.
Fine Arts	B.F.A.
History of Architecture and Urbanism	B.S.
Urban and Regional Studies	B.S.

The college offers programs leading to the bachelor's degree—the five-year program in architecture leads to the bachelor of architecture; four-year programs in art and architecture lead to the bachelor of fine arts. In addition, four-year programs with a concentration in either urban and regional studies or history of architecture lead to the bachelor of science.

Graduate-level programs are offered in art, architectural design and urban design, architectural science, history of architecture and urbanism, historic preservation planning,

city and regional planning, regional science, and landscape architecture.

Students in most of these programs work in physical proximity to one another and thus gain a broader understanding of their own special area of interest through contact with students and faculty from other disciplines.

Early in its development, the college set a limit on the number of students it would enroll and devised a selective method of admission. There are now more than 670 students and a full-time teaching staff of over 60, supplemented by visiting professors and critics, part-time lecturers, and assistants. Teachers and students mix freely, and much instruction and criticism is on an individual basis.

The college's courses are integral parts of the professional curricula. Fundamental subjects are taught by faculty members whose experience provides them with professional points of view. The concentration of professional courses within the college is balanced by the breadth of view gained from courses and informal learning in the rest of the university. The college believes that this breadth is an essential element of professional education. This conviction is evident in the form of the curricula, the methods of teaching, and the extracurricular life of teachers and students.

FACILITIES

The college occupies Sibley Hall, Olive Tjaden Hall, Rand Hall, and the Foundry, as well as space at 531 Esty Street in downtown Ithaca. Facilities for architecture and city and regional planning, as well as college administrative offices, and the Fine Arts Library, are located in Sibley Hall. The Department of Art is housed in Olive Tjaden Hall. Sculpture facilities are in the Foundry and architecture design studios and shop facilities are in Rand, Sibley, and at Esty Street. The Green Dragon Café, a student eatery and lounge, is located in the lower level of Sibley Dome. Darkrooms in the Department of Art are available for general use by students in the college and are used primarily as laboratories for the photography courses. Each user must pay a darkroom fee. Information about darkroom rules and regulations, hours, and equipment is available at the darkroom circulation desk.

Through the generosity of the late Lillian P. Heller, the college also owns the Miller-Heller House, home of William H. Miller, the first student to enroll for the study of architecture at Cornell, and later a practicing architect in Ithaca. This building is used to house visiting teachers and guests of the college and for occasional receptions and social events.

Libraries

The Fine Arts Library in Sibley Hall serves the College of Architecture, Art, and Planning through its collections on architecture, fine arts, city and regional planning, and

landscape architecture. The library, with more than 207,000 books, is capable of supporting undergraduate, graduate, and research programs. Some 1,400 serials are currently received and maintained.

The facilities of the libraries of other schools and departments on campus and the John M. Olin Library, designed primarily as a research library for graduate students, are also available.

Museums and Galleries

The Herbert F. Johnson Museum of Art was formally opened in May 1973. Although many of its exhibitions and activities relate directly to academic programs of the university, the museum has no administrative affiliation with any department. In this way, its programs freely cross academic boundaries, stimulating interchange among disciplines. With a strong and varied collection and a continuous series of high-quality exhibitions, it fulfills its mission as a center for the visual arts at Cornell. Throughout the year, works of students, faculty, and staff in the College of Architecture, Art, and Planning and of guest artists may be viewed in the John Hartell Gallery in Sibley Dome and in the Olive Tjaden Gallery in Olive Tjaden Hall. Art galleries are also maintained in Willard Straight Hall, where loan exhibitions of paintings and graphic work by contemporary artists are held.

Cornell in Rome

Cornell in Rome is a semester-long study-abroad program of Cornell University's College of Architecture, Art, and Planning. Educating students in Italy for 20 years, the program has provided a transformative experience for young, developing artists, architects, urbanists, and scholars. The program is open to students in and outside Cornell in the disciplines of architecture, visual art, and urban studies, as well as related fields like art history, classics, European studies, medieval studies, and sociology.

Drawing upon the historical and cultural resources of Rome, its museums, art, and architecture, and the city's beauty and complexity as an ancient and yet modern world capital, a semester in Rome has proven to be a pivotal semester for both intellectual and personal growth. The program provides extensive studio work, onsite classes, and a rich field trip itinerary.

Courses are offered in both fall and spring terms in architecture, architecture history, art, art history, drawing, photography, architecture theory, contemporary Italian culture, European politics, and Italian language. Courses in urban studies are offered in the spring semester only. Weekly classes use the city and its wealth of museums and galleries, archaeological sites, villas, churches, and remarkable public spaces for onsite study, as well as Rome's many neighborhoods, for field-based learning activities.

Cornell in Rome's resident faculty members, chosen from the best local and internationally known scholars, critics, architects, and artists, are all expert at using the city as an unparalleled resource for instruction and inspiration. Additionally, distinguished Cornell professors from the Departments of Architecture, Art, and City and Regional Planning live and teach in Rome for the entire term.

The program is based at Palazzo Lazzaroni, a handsomely restored 17th-century palazzo in the historic center of Rome. All participants are housed in large, completely furnished apartments with wireless Internet access, all within walking distance of studio and classroom space. Students enjoy daily contact with the urban life of a major, European city and its nearly 3,000 years of history and extraordinary backdrop of art and architecture.

Application is made in the academic year before participation. The deadline for both fall and spring semesters is November 1 for AAP students and January 15 for all out-of-college applicants. Accepted students must confirm their enrollment by February 15. Detailed course and program information may be found at www.rome.cornell.edu. Students are also welcome to stop by the Cornell in Rome office at 149 East Sibley Hall.

AAP NYC

The College of Architecture, Art, and Planning's rapidly expanding studio and classroom facility in New York City offers undergraduate and graduate students a unique opportunity to live and study in one of the most culturally vital urban centers in the world, while gaining valuable professional experience at design firms, studios, and innovative public, private, and nonprofit organizations throughout the city. Located on 17th Street near Union Square, in the vibrant Chelsea neighborhood of Manhattan, AAP NYC's loft provides expansive studio and seminar space for short-term and semester-long use by the entire college. The location is an ideal base for the study of urban and social policy, for museum and gallery visits, or for exposure to a wealth of art and architectural history and practice.

AAP NYC offers a full roster of courses enriched by New York City's unique artistic, historical, and cultural resources and by AAP's extensive alumni network of noted metropolitan professionals, who frequently teach and serve as guest critics and mentors. The programming expands opportunities for AAP's undergraduates, allowing them to now take advantage of study in two world capitals—New York City and Rome—while easily meeting graduation requirements.

Application is made in the academic year prior to participation. The deadline is November 1 for AAP students and January 15 for all out-of-college applicants. Detailed program information can be found at www.aap.cornell.edu/aap/nyc.

COLLEGE ACADEMIC POLICIES

Ownership of Student Work

All drawings, models, paintings, graphic art, and sculpture done in the studios and drafting

rooms as a part of the instructional program are the property of the college until they have been graded and released by the instructor. Certain works may be selected by the college for retention for academic purposes.

Exhibitions of Student Work

Exhibitions of student work are held each semester as part of the yearly schedule of the Olive Tjaden Gallery and the John Hartell Gallery in Sibley Dome. These galleries display work from a specific course or exhibit examples of recent work by individual faculty members, students, and visitors.

Minors

Students may pursue minors in any department in any college that offers them, subject to limitations placed by the department offering the minor or by the students' major. Completed minors will appear on the student's transcript. Not all departments offer minors. Consult the appropriate section in this catalog or contact the appropriate department for information on minors offered and how to pursue a minor.

Scholastic Standards

Semester by semester, a candidate for an undergraduate degree in this college is required to successfully complete a minimum of 12 academic credit hours with a minimum grade point average for the semester of C+ (2.3). The record of each student who falls below the standard will be reviewed by the college's Academic Records Committee for appropriate action, among those described below:

1. The student is issued a **Warning**. This means the student's performance does not meet expectations. Unless improvement is shown in the subsequent semester, the student may be placed on **Final Warning** or given a **Required Leave of Absence** from the college.
2. The student is issued a **Final Warning**. This indicates the student's record is unsatisfactory. Unless considerable improvement is shown in the subsequent semester, the student may be given a **Required Leave of Absence** from the college.
3. The student is placed on a **Required Leave of Absence**. The student is dismissed from the college and may not continue studies in the college. A student who has been placed on a required leave of absence may request to resume studies after a leave of absence of at least two semesters. This request is made by letter addressed to the college registrar, B1 W. Sibley Hall, Ithaca, NY 14853-6702. The student must submit evidence that time has been well used, and if employed, the student must submit a letter from the employer(s). Students on required leave are not allowed to register extramurally at Cornell, as the intention of the required leave is to insist upon a break from study at Cornell. If a student chooses to enroll in courses at another institution while on a required leave, credit is not granted automatically. Upon receiving permission to return, a student must petition the department and include an official transcript to request credit for courses

taken. A return to study in the college after a required leave of absence is at the discretion of the college's Academic Records Committee. Requests for spring-semester return must be made by October 1 and requests for fall-semester return must be made by March 1. The second required leave of absence is a de facto dismissal and the student will be permanently withdrawn from the college.

4. The student is placed on a **Required Withdrawal**. The student may not reregister in the College of Architecture, Art, and Planning and is dismissed from the college and is permanently prohibited from continuing studies in it.

The required withdrawal action does not prevent the student from applying for admission to another division of the university.

The above actions are not necessarily sequential. A student who has received a warning may be placed on a required leave of absence at the end of the next semester if the performance during that semester is deemed to be grossly deficient.

It is necessary to have a cumulative grade point average of at least 2.0 (C) for graduation.

Leaves of Absence

The College of Architecture, Art, and Planning adopted the following leave of absence policy effective in the fall of 2006:

Leaves of absence will be of four types:

1. **Voluntary leaves of absence for personal reasons** may be granted for a variety of reasons. The student may request a voluntary leave of absence no later than the third week of class in the affected term. The department may set conditions for completion of work, new and incomplete course work, community service, or internships while the student is on leave. The student may not attend classes at Cornell through the School of Continuing Education and Summer Sessions. The term limit of this type of leave is five years. Following the end of the fifth year, the student will be automatically withdrawn from the college.
2. **Voluntary leaves of absence with conditions** may be granted for students desiring to take a voluntary leave for personal reasons but who are not in good academic standing or they wish to take a leave during the current term. Conditional leaves are at least two semesters in length. The department will set conditions for completion of work, new and incomplete course work, community service, or internships while the student is on leave. Students may be granted conditional leaves of absence after the 12th week of the term only in highly extenuating circumstances and with the approval of the student's department and the Academic Records Committee (ARC). The student may not attend classes at Cornell through the School of Continuing Education and Summer Sessions. The student's academic status is subject to review at the time of the leave and upon the student's return.

3. **Voluntary leaves of absence for health reasons** may be granted by the college upon the recommendation of Counseling and Psychological Services (CAPS) or Gannett Health Services. They are usually no less than six months in duration. The department may set conditions for completion of work, new and incomplete course work, community service, or internships while the student is on leave. The college may impose additional conditions appropriate to the individual situation. The student may not attend classes at Cornell through the School of Continuing Education and Summer Sessions. The student's academic status is subject to review at the time of the leave and upon the student's return. Students must receive approval to return from this type of leave, both from CAPS or Gannett as well as the student's department and the ARC.
4. **Required leaves of absence for academic reasons.** The ARC may vote for a required leave if the student is not making satisfactory progress in the degree program (defined by completion of a minimum of 12 academic credits with a minimum GPA of 2.3 each term unless there are special circumstances). The department may set conditions for completion of work, new and incomplete course work, community service, or internships while the student is on leave. The college may impose additional conditions appropriate to the individual situation. The student may not attend classes at Cornell through the School of Continuing Education and Summer Sessions. The student's academic status is subject to review at the time of the leave and upon the student's return.

Return from Leave of Absence

Students who desire to return from any of these leaves shall submit a written request to the AAP Registrar's Office. Requests for spring-semester return must be made by October 1 and requests for fall-semester return must be made by March 1. The request will be reviewed and approved first by the department. The recommendation of the department will be forwarded to the college ARC for its review and action. If the student request to the department results in a "no pass" outcome, the student may appeal in writing to the ARC within two weeks of receipt of the department decision. The final decision then rests with the ARC. No appeals will be considered following the decision of the ARC.

It is expected that the department and college committees will review and act on requests to return to study by April 15 for requests to return to study in the fall term and by November 15 for requests to study in the spring term.

ARCHITECTURE

to be determined, interim chair (137 East Sibley Hall, 255-5236); L. Chi, M. Cruvellier, M. Curry, W. Goehner, D. P. Greenberg, G. Hascup, K. Hubbell, D. M. Lasansky, B. G. MacDougall, A. B. Mackenzie, L. Mirin, V. Mulcahy, J. Ochshorn, C. F. Otto, A. Ovaska, K. Pratt, H. W. Richardson, M. Silver, A. Simitch, V. K. Warke, J. Wells, M. Woods, J. Zissovici

Department of Architecture Program Mission

If one could identify a singular philosophy for the architecture program at Cornell, it would be that architecture is a conceptual problem-solving discipline. The goal of the program is to produce conceptual thinkers, versed in the skills, history, theory, and science of their field. In part, the success of the program can be attributed to the quality of students and faculty members combined with their dedication and enthusiasm. Companion undergraduate and graduate programs in the fine arts and in city and regional planning have also greatly contributed to the department's strength. The influence of these programs has created a philosophy that is unique to Cornell: that the individual work of architecture is thought of as part of a greater whole and exists in a determinate physical context. Furthermore, the students and their work are also placed in a historical context, creating a sense of the continuity of architectural thought.

The intention has always been to instruct architecture students in issues of basic and more sophisticated formal principles, developing an aptitude for functional and programmatic accommodation, structural and technological integration, energy-conscious design, and materials and methods of construction. Virtually every architecture school does this. Cornell, however, differs from most schools in the way it teaches students about architecture: we do not teach architecture; instead we try to teach students how to learn about architecture (witness, for example, the inordinate number of Cornell alumni teaching in architecture programs). Rather than train architects who think of buildings as autonomous objects frozen in an assigned ideology, our goal is to produce architects who are capable of making independent judgments rooted in an ever-changing context of architectural thought.

To affect these goals, design at Cornell is taught as an intellectual discipline steeped in societal and cultural values. Architecture is taught as the integration of thought, form, and structure. Design problems frequently are located within real physical contexts and are evaluated in relation to those motivations that shaped the environment over time. Architecture, it is assumed, resides in the integration of idea and fact.

The development of form and space is critical to architectural design. Equally significant is the responsible resolution of functional requirements integrated with actual and perceived structure. The excellence of architectural art, however, derives from the exploration and refinement of ideas, upon which form, purpose, and structure are dependent. Deemed essential at Cornell is that the student grapple not only with fact, but with the substance of fact. Consequently,

the investigation of architectural content is pursued in protracted and continuous study. Architecture studios extend into the classroom and the library; they embrace the humanities and sciences, tradition and innovative effort.

Professional Degree Programs

Note on Professional Accreditation

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

Cornell University, College of Architecture, Art, and Planning, Department of Architecture offers a NAAB-accredited bachelor of architecture degree program.

B. Arch. (176 undergraduate credits)

Next accreditation visit for the B.Arch. program: 2010

The NAAB grants candidacy status to new programs that have developed viable plans for achieving initial accreditation. Candidacy status indicates that a program should be accredited within six years of achieving candidacy, if its plan is properly implemented. In order to meet the education requirement set forth by the National Council of Architectural Registration Boards, an applicant for an NCARB Certificate must hold a professional degree in architecture from a program accredited by the NAAB; the degree must have been awarded not more than two years prior to initial accreditation.

Cornell University, College of Architecture, Art, and Planning, Department of Architecture was granted candidacy status for the Professional Master of Architecture in 2004.

M.Arch I (pre-professional degree + 115 graduate credits)

Continuation of candidacy granted: 2007

Projected year of initial accreditation: 2010

Bachelor of Architecture

The undergraduate professional program is normally five years in length and is designed particularly for people who, before they apply, have established their interest and motivation to enter the field. It therefore incorporates both a general and professional educational base.

The program is oriented toward developing the student's ability to deal creatively with architectural problems on analytical, conceptual, and developmental levels. The sequence courses in design, consisting of studio work augmented by lectures and seminars, are the core of the program. Sequences of studies in the history of architecture and cities, culture and society, architectural theory, visual studies, environmental control, structures, construction, and computer applications provide a base for the work in design.

In the first three years, the student has the opportunity to establish a foundation in the humanities and sciences through electives. During the fourth and fifth years, this base may expand through further detailed studies in these areas. Within the professional program a basis for understanding architecture in its contemporary and historical cultural contexts is established.

The structure of the program incorporates considerable flexibility for the individual student to pursue his or her particular interest in the fourth and fifth years. By carefully planning options and electives in the fifth year, it is possible for a qualified student to apply the last year's work for the bachelor of architecture degree to the post-professional M. Arch. II program. Some students are then able to complete the requirements for the master's degree in one additional year.

Professional Master of Architecture (M. Arch. I)

Cornell's graduate professional degree program (in NAAB candidacy status) is a 3½-year course of study dedicated to preparing graduate students from diverse disciplines and backgrounds for careers in architecture. The program builds on the excellence and distinction of Cornell's renowned B.Arch. degree, but is specifically crafted to engage the unique strengths and needs of the graduate student. Committed to the view that the question of appropriate practice must be continually investigated and reassessed in today's globally expansive and technologically dynamic context, the program places this concern at the center of the learning process, seeking to empower the student's sense of inquiry, responsibility, and creativity. Teaching in the program complements basic skills and knowledge essential to the profession with engagement in emergent social, cultural, technical, and environmental concerns that characterize architecture's expanded field in the 21st century.

The curriculum comprises a rich offering of courses in visual representation, history and theory of architecture, building technology, and professional practice, complemented by six semesters of design studios. The design studio is the core of the curriculum, with the design project serving as a negotiating platform between diverse practices, technologies, and fields of knowledge. The intensive course of study encourages the development of individual research trajectories at the upper levels, and culminates in a one-semester design thesis. Making full use of Cornell University's excellent resources across all disciplines, the professional Master of Architecture situates itself globally, drawing upon distinguished national and international visitors as well as the AAP in New York City studio. The professional Master of Architecture is open to applicants possessing a four-year bachelor's degree in any area.

Cornell in Rome

Cornell in Rome has been an integral part of architectural study at Cornell University for 20 years. Architecture students traditionally look forward to this semester abroad for first-hand experience of buildings and urban spaces previously studied only in classes and lectures. Rome, with its unparalleled complexity of historical layers, presents the student of architecture with the challenge of visualizing architecture in a city where the intensity of history pervades.

The city teaches students to understand that history can become a critical foundation for understanding architectural design as an integral component of the urban context. Complete immersion in this distinctive and complex milieu presents students with new and different problems and decisions; through analysis and understanding of historic examples, experience and insight are gained for future design challenges.

Design studios, complemented by visits to important buildings, museums, and monuments both in Rome and throughout Italy, emphasize onsite observation, measuring, drawing, and projection, while history courses and theory seminars encourage students to engage in analytical thinking, direct study, and cultural interpretation.

Italian and European architects and educators complement faculty members from Cornell in teaching the 6-credit studio and assist in formulating and contributing to a rich variety of seminars, lectures, and field trip programs.

Architecture Requirements

Fourth-year architecture students in good academic standing who have completed the requirements of the first three years of the five-year B.Arch curriculum are eligible for participation in Cornell in Rome.

The program also is open to third-year students by petition, if space permits.

AAP in NYC

AAP NYC provides the opportunity for architecture students to study, work, and live in one of the world's most dynamic urban contexts. With its pivotal location, the architecture program at AAP NYC attracts guest faculty members not only from the city but from international locales as well. The program allows students to build on the core curricular foundations of their Ithaca-campus experience in a more directly applied format, using the city as a classroom and world-class professionals as their critics and faculty.

Additionally, undergraduate students are encouraged to take advantage of the wealth of architectural practices in New York by working two days per week in selected offices while pursuing their studies. As a result, AAP NYC serves as a bridge from school to the profession—one that allows students to consider their own future trajectories and the possible paths toward achieving them.

B.Arch. Curriculum

Please refer to the *AAP Student Handbook* at www.aap.cornell.edu/aap/student-services/ for the most up-to-date B. Arch. curriculum information.

First Year

<i>Fall Semester</i>	<i>Credits</i>
1101 Design I	6
1801 History of Architecture I	3
1501 Drawing I: Freehand Drawing	2
MATH 1110 Calculus or out-of-college elective	3-4
Out-of-college elective	3
	<hr/> 18-19

Spring Semester

1102 Design II	6
1802 History of Architecture II	3
1502 Drawing II: Drawing Systems	2
MATH 1106 or 1110 or out- of-college elective	3-4
Out-of-college elective (first-year writing seminar suggested)	3
	<hr/> 17-18

Second Year

<i>Fall Semester</i>	<i>Credits</i>
2101 Design III	6
2603 Structural Concepts	4
2301 Architectural Analysis I	2
2602 Building Technology, Materials, and Methods	3
ARCH 2503 Drawing III: Digital Media in Architecture or out-of-college elective	2-3
	<hr/> 17-18

Spring Semester

2102 Design IV	6
2302 Architectural Analysis II	2
2601 Environmental Systems—Site Planning	3
2604 Structural Elements	3
ARCH 2503 Drawing III: Digital Media in Architecture or college elective	2-3
	<hr/> 16-17

Third Year

<i>Fall Semester</i>	<i>Credits</i>
3101 Design V	6
3402 Architecture as a Cultural System	3
3601 Environmental Systems II— Thermal Environmental Systems	3
Departmental elective	3
Out-of-college elective	3
	<hr/> 18

Spring Semester

3102 Design VI	6
3603 Structural Systems	3
3602 Environmental Systems III— Building Systems Integration	3
Departmental elective	3
College or out-of-college elective	3
	<hr/> 18

Fourth Year

<i>Fall Semester</i>	<i>Credits</i>
4101 Design VII	6
Departmental elective	3
Departmental elective	3
College elective	3
Out-of-college elective	3
	18

<i>Spring Semester</i>	<i>Credits</i>
4102 Design VIII	6
5201 Professional Practice	3
Departmental elective	3
College or out-of-college elective	3
Out-of-college elective	3
	18

Fifth Year

<i>Fall Semester</i>	<i>Credits</i>
5101 Design IX	6
Departmental elective	3
ARCH 5110 Thesis Proseminar	2
Out-of-college elective	3
Out-of-college elective	3
	17

<i>Spring Semester</i>	<i>Credits</i>
5901 Design X	8
Departmental elective	3
Out-of-college elective	3
College or out-of-college elective	3
	17

Required Departmental Courses

<i>Semesters</i>	<i>Subject</i>	<i>Course Numbers</i>	<i>Credits</i>
10	design	1101-5902	62
1	mathematics	MATH 1110, MATH 1106, or approved equivalent	3-4
3	structures	2603, 2604, 3603	10
4	technology	2601, 2602, 3601, 3602	12
2	architectural theory	2301, 2302	4
2	history of architecture	1801, 1802	6
1	architecture, culture, and society	3402	3
1	professional practice	5201	3
1	proseminar	5110	2
3	drawing	1501, 1502, 2503	6
			109-110

Electives

<i>Departmental Semesters</i>		<i>Credits</i>
3	history of architecture: 3000 level	9
1	visual representation in architecture	3
2	architectural theory or 6000-level design-related course	6
1	architectural structures, construction, or environmental systems and conservation	3
		21

<i>College Semesters</i>		<i>Credits</i>
2	art: any studio courses (ART 2104 will fulfill)	6

<i>Out-of-College Semesters</i>		<i>Credits</i>
1	first-year writing seminar	3
1	mathematics, or physical or biological sciences	3
1	humanities	3
		9

<i>Free</i>		<i>Credits</i>
Of the electives, 15 credits are to be taken outside the College of Architecture, Art, and Planning, and 15 credits may be taken either in or outside the college.		15
Total credits		176

Architecture Concentrations for Majors

The Department of Architecture recognizes any concentration earned within the university but outside of the department (using standards set by those departments) on the transcripts of its students.

It is often advantageous for undergraduates to concentrate in specific subdisciplines of architecture, especially if they anticipate application to specialized graduate programs; therefore, the following concentrations in architecture are offered within the department for B. Arch. and B.F.A. in architecture candidates only:

Architecture, Culture, and Society 3402 (or equivalent), plus 9 credits in this area.

Architectural Science and Technology 2601, 2602, 2603, 2604, 3601, 3602, 3603, distribution requirement (3 credits), plus 6 credits in this area.

History of Architecture 1801, 1802, distribution requirements (9 credits), plus 7 credits (including a 4-credit seminar course) in this area.

Theory of Architecture 2301, 2302, distribution requirements (6 credits), plus 6 credits in this area.

Visual Representation in Architecture 1501, 1502, distribution requirement (3 credits), plus 9 credits in this area.

Students wishing to receive recognition for a concentration must submit a concentration request form to the Architecture Department office. For a course to count toward a concentration, the student must receive a grade of C or better.

Transfer Students

Although the program leading to the bachelor of architecture is directed specifically to those

who are strongly motivated to begin professional study when entering college, it is sufficiently flexible to allow transfers for students who have not made this decision until after they have been in another program for one or two years. Individuals who have already completed a nonprofessional undergraduate degree may apply to the professional M. Arch. I program.

Transfer students are responsible for completing that portion of the curriculum which has not been covered by equivalent work. Applicants who have had no previous work in architectural design must complete the 10-semester design sequence. Since this sequence may be accelerated by attending summer semesters, seven or eight regular semesters and two or three summer terms are typically required.

Admission is offered to a limited number of transfer applicants who have completed a portion of their architecture studies in other schools. Each applicant's case is considered individually. Transfer students must complete a minimum of 70 credits and four semesters in residence, taking 35 of the 70 credits (including four semesters of design) in the Department of Architecture. Placement in the design sequence is based on a review of a representative portfolio of previous work.

For those who would benefit from an opportunity to explore the field of architecture before deciding on a commitment to professional education, the department offers an introductory summer program that includes an introductory studio in architectural design, lectures, and other experiences designed to acquaint participants with opportunities, issues, and methods in the field of architecture.

Alternative Programs

Bachelor of Fine Arts

After completing the first four years of B. Arch. requirements, the student may choose to receive the degree of bachelor of fine arts (B.F.A.) in architecture, *which is not a professional degree*.

A student wishing to receive this degree must submit a petition to the Petition Committee, verified by the college registrar, that the first eight semesters of required B.Arch. courses can be satisfactorily completed and that the following minimum distribution requirements will be met:

- 1 Art studio course (3 credits)
- 1 Mathematics course: MATH 1110, 1106, or approved equivalent (3-4 credits)
- 1 First-Year Writing Seminar (3 credits)
- 1 Mathematics or physical or biological sciences course (3 credits)
- 1 Humanities course (3 credits)

Students are admitted to this degree program only via the B.Arch. degree track. Students who are awarded a B.F.A. in Architecture degree may not reregister in the B.Arch. program.

Bachelor of Science in History of Architecture

The history of architecture major leads to a bachelor of science degree, conferred by the College of Architecture, Art, and Planning. The major is intended for transfer students from other programs at Cornell and from

colleges and universities outside Cornell. Students in the Department of Architecture and the College of Arts and Sciences may take the major as part of a dual-degree program. The course of study in this major, available to students from a variety of academic backgrounds, offers the opportunity for a vigorous exploration of architecture and its history.

Admission requirements. Two years of undergraduate study, ARCH 1801 and 1802 or the equivalent. Students transferring from a B. Arch. program must be in good standing in their design sequence.

Procedure. Students from Cornell may transfer to the program at the beginning of the fall semester of their third or fourth year of study. They submit a short application as prospective internal transfer students. Before applying, all prospective internal transfer students meet with a history of architecture faculty member to discuss scheduling for the program.

All students who wish to enter the program, either from Cornell or other institutions, must apply by November 15 for spring admission or by March 31 for fall admission. Applications for both internal and external transfer students are available from the Admissions Office, College of Architecture, Art, and Planning, Cornell University, B-1 West Sibley Hall, Ithaca, NY 14853-6702. Completed applications must be submitted to the Admissions Office.

Curriculum. A student entering the program is assigned an advisor from the history of architecture faculty in the Department of Architecture. Advisor and student together prepare an appropriate two-year course of study according to the following guidelines:

1. 24 credits of 3000-level courses in architectural history: ARCH 3800 through 3819
2. 12 credits in 6000-level architectural history seminars: ARCH 6800 through 6819; or 8 credits in a 6000-level seminar plus ARCH 4901, offered for honors candidates only
3. One 3000-, 4000-, or 6000-level course in architectural theory
4. 24 credits in electives selected in consultation with the student's advisor
5. Language requirement, to be met in the manner specified for students enrolled in the College of Arts and Sciences

Honors program. Students graduate with honors if, during their two years of study in the program, they have a cumulative average of B or better in all courses, have no grade lower than A- in all history of architecture courses taken at the 3000 level, and have completed an honors thesis (ARCH 4901) deemed to be of distinguished quality by the history of architecture faculty.

Dual-Degree Options

Students can earn both the B.S. and B. Arch. degrees either simultaneously or sequentially. Students who have transferred into the B. Arch. program at Cornell may find this to be a special opportunity for an enlarged and enriched program of study.

Students currently enrolled in the College of Arts and Sciences at Cornell can earn a B.A. in an arts college major and a B.S. in the history of architecture in five years. In this

option, students complete a minimum of 150 credits, which includes the B.S. prerequisites and curriculum requirements and 100 credits of the usual distribution and major requirements in the College of Arts and Sciences. Further information about this option is available at the Admissions Office, B-1 West Sibley Hall, and at the Academic Advising Center of the College of Arts and Sciences, 172 Goldwin Smith Hall.

Students may also elect to continue toward a master of arts degree in the history of architecture. The M.A. ordinarily requires a minimum of two years of graduate work beyond the bachelor's degree; with this special sequential degree arrangement that time is shortened to one year.

Summer Term in Architecture

The summer term offers students the opportunity of a concentrated period of design work; the term is six to eight weeks in duration.

Undergraduate design sequence courses, excluding 1101 and 5902, are offered in Ithaca. Normally there is also a design program abroad for third-, fourth-, and fifth-year students.

Students from schools of architecture other than Cornell are welcome to enroll in any summer program.

Other department courses may be offered as elective courses, contingent upon student interest, faculty availability, and departmental approval.

The department offers a Career Explorations in Architecture Program for high school students and college-level students considering a professional education in architecture.

Minor in Architecture for Nonmajors

A special minor has been formulated specifically for those students not enrolled in the Department of Architecture but who are interested in complementing their current academic program with an introduction to various facets of architectural studies. Some students may wish to use the Minor in Architecture for Nonmajors as a means of investigating possible graduate studies in architecture. Some may wish to develop architectural specialties within other disciplines. Students meeting the requirements for this minor should complete a minor form, which is available in the architecture department office. This form, when validated by the architecture department, serves as evidence of completion of the minor requirements.

The curriculum for students in the Minor in Architecture Program totals 14 credit hours minimum, including 8 credits of required courses and 6 credits of elective courses. Grades earned must be C or better in all courses.

Required courses. A minimum of 8 credits, including one design studio, one visual studies course (e.g., drawing), and one history of architecture course. For example,

ARCH 1110 Introduction to Architecture Design Studio (offered summer only) 3 credits

or

ARCH 1103 Elective Design Studio (offered fall only, not offered every year) 6 credits

(ARCH 1103 may substitute for ARCH 1110; students who complete ARCH 1103 must take all other course requirements for the concentration.)

ARCH 1501 Drawing I (fall only) 2 credits

ARCH 1801 or 1802 History of Architecture I or II (ARCH 1801, fall; ARCH 1802, spring) 3 credits

Departmental elective courses: A minimum of 6 credits, including two departmental elective courses, are required.

Professional Master of Architecture (in NAAB candidacy status)

Mission Statement

Consistent with the broader mission of the Department of Architecture, the Master of Architecture program (in NAAB candidacy status) is dedicated to preparing graduate students from diverse disciplines and backgrounds for careers in architecture. The program is committed to the view that the nature of contemporary practice must be continually investigated and reassessed in today's globally expansive and technologically dynamic context. The program places the question of practice at the center of the learning process. It posits alternative models and methods of research and seeks to empower the student's sense of inquiry, responsibility, and creativity as she or he formulates her or his unique professional trajectory. The program aims in particular to engage the unique strengths and needs of the graduate student: her or his maturity, commitment to architecture, and the wealth and variety of academic and life experiences she or he brings to the discipline. The pedagogy sets skills and knowledge essential to the profession in a context of emergent cultural, technical, and environmental concerns that characterize the expanded field of architecture in the 21st century.

Curriculum

Term One	Units/Credit Hours	
ARCH 5111	Core Design Studio I	6
ARCH 5511	Techniques in Vis Rep I: Freehand and Analytical Drawing	3
ARCH 5301	Theories and Analyses of Architecture I	3
ARCH 5603	Structural Concepts	4
ARCH 5801	History of Architecture I	3
		<hr/> 19
Term Two		
ARCH 5112	Core Design Studio II	6
ARCH 5512	Techniques in Vis Rep II: Analog/Digital Constructed Drawing	3
ARCH 5302	Theories and Analyses of Architecture II	3
ARCH 5604	Structural Elements	3
ARCH 5802	History of Architecture II	3
		<hr/> 18

Term Three	
ARCH 5113 Core Design Studio III	6
ARCH 6601 Environmental Systems II: Thermal Environmental Systems	3
ARCH 5602 Building Technology, Materials, and Methods	3
History Elective or Theory Elective*	3
Visual Representation Elective	3
	<hr/> 18
Term Four	
ARCH 5114 Core Design Studio IV	6
ARCH 6602 Environmental Systems III: Building Systems Integration	3
ARCH 6603 Structural Systems	3
ARCH 5402 Architecture, Culture, Society	3
Open Elective	3
	<hr/> 18
Term Five	
ARCH 5115 Core Design Studio V: Integrative Design Practices	6
ARCH 5201 Professional Practice	3
ARCH 8911 Proseminar in Design Research	3
History or Theory or Visual Representation Elective*	3
	<hr/> 15
Term Six	
ARCH 5116 Vertical Design Studio	6
Visual Representation Elective	3
Open Elective	3
History or Theory or Visual Representation Elective*	3
	<hr/> 15
Term Seven	
ARCH 8912 Independent Design Thesis	9
Open Elective	3
	<hr/> 12
Total Units/Credit Hours	115

* Total required for graduation:

- 1 Theory elective
- 1 History elective
- 1 Theory or History elective
- 2 Visual Representation electives

Course Information

Courses in brackets are not offered this year.

A \$350 fee is charged to all registered architecture students (undergraduates, graduate students, and New York City Program and Rome Program participants) and is used to generate funds for the upkeep of computer and fabrication facilities.

Architectural Design

Sequence Courses

ARCH 1101 Design I

Fall, spring. 6 credits. Prerequisite: department students. Staff. Introduction to design as a conceptual discipline directed at the analysis, interpretation, synthesis, and transformation of the physical environment. Exercises are

aimed at developing an understanding of the issues, elements, and processes of environmental design.

ARCH 1102 Design II

Spring. 6 credits. Prerequisite: department students; ARCH 1101 and 1501. Staff. Continuation of ARCH 1101. Covers human, social, technical, and aesthetic factors related to space and form. Design problems range from those of the immediate environment of the individual to that of small social groups.

ARCH 2101-2102 Design III and IV

Fall and spring. 6 credits each semester. Prerequisites: department students; ARCH 1501-1502; for ARCH 2101, ARCH 1102 and 1502; for 2102, ARCH 2101. Corequisite: ARCH 2301-2302. Staff.

ARCH 3101 Design V

Fall and spring. 6 credits. Prerequisites: department students; ARCH 2102. Staff.

ARCH 3102 Design VI

Fall and spring. 6 credits. Prerequisites: department students; ARCH 3101. Staff. One of the key design experiences during this semester will be the dialogic interaction of architectural conceptions and building subsystems as simulated in the design studio. The requirements of building subsystems are seen to both support and inform architectural concepts and form. Questions of passive architectural responses versus active technical responses, as well as issues of thermal comfort, energy efficiency, sustainability, structure, and life safety will be addressed.

ARCH 4101-4102 Design VII and VIII

Fall and spring. 6 credits each semester. Prerequisite: department students; for ARCH 4101, ARCH 3102 and 3602; for 4102, ARCH 4101. Staff. Programs in architectural design, urban design, or architectural technology and environmental science and topical studies.

ARCH 5101 Design IX

Fall or spring. 6 credits. Prerequisite: department students; ARCH 4102. Staff. Programs in architectural design, building typology investigations, and research leading to complete development of the student's thesis program. General instruction in the definition, programming, and development of a thesis.

ARCH 5902 Design X—Thesis

Fall or spring. 8 credits. Requirement for B. Arch. candidates who must satisfactorily complete a thesis. Prerequisite: ARCH 5101. Staff.

Graduate Courses

ARCH 5111 Core Design Studio I

Fall. 6 credits. Introduction to fundamental concepts of architectural design and representation, including preliminary notions of site, program, and context. Emphasis on interpretive, analytical, and generative uses of drawing, physical modeling, and digital media in the design process.

ARCH 5112 Core Design Studio II

Spring. 6 credits. Prerequisite: ARCH 5111. Continuation of subjects developed in the first term. Focus on issues of program and architectonics in the design of a building type in context; introduction to site planning.

ARCH 5113 Core Design Studio III

Fall. 6 credits. Prerequisite: ARCH 5112. Focus on issues of program and architectonics in the design of a complex building type. Emphasis on interpretive, analytical, and generative uses of digital media.

ARCH 5114 Core Design Studio IV

Spring. 6 credits. Prerequisite: ARCH 5113. Focus on architecture's expanded sites: social, cultural, material, and/or environmental considerations of building in a complex urban landscape.

ARCH 5115 Core Design Studio V: Integrative Design Practices

Fall. 6 credits. (New York City). Prerequisites: ARCH 5114, 5602, 5604, 6601, 6602, 6603. Focus on the development of architectural ideas in constructed, material form. The studio explores emergent topics and constructive methods in contemporary architectural practice. Design study includes the creation of a comprehensive set of representations that describes an architectural project in detail. Students work in collaborative groups and in consultation with advisors drawn from professional practice to develop a project that engages a complex range of topical areas, including: structural and environmental systems, building envelope systems, materiality and construction, life-safety planning, and sustainability.

ARCH 5116 Vertical Design Studio

Spring. 6 credits. Prerequisite: ARCH 5115. Open to professional and post-professional M. Arch. students. The vertical studios are topical in nature and engage contemporary issues in architectural practice and research.

ARCH 7111 Design A

Fall. 6 credits. Staff. Exploration of themes, methods, and technologies in contemporary design.

ARCH 7912 Design B: Topics Studio

Spring. 6 credits. Staff. Graduate vertical research studio.

ARCH 8901 Thesis or Research in Architectural Design

Fall or spring. 9 credits. Prerequisite: ARCH 7111-7912. Staff. Second-year design course for M. Arch. II students whose major concentration is architectural design.

ARCH 8902 Thesis or Research in Urban Design

Fall or spring. 9 credits. Prerequisite: ARCH 7111-7912. Staff. Second-year design course for M. Arch. II students whose major concentration is urban design.

ARCH 8911 Proseminar in Design Research

Spring. 3 credits. Prerequisites: ARCH 5301 and 5302.

ARCH 8911 offers a synthesis of design and research methods for the development of an independent thesis proposal. Course work includes exposure to different theories and practices of design inquiry, explorations of critical positions for individual development, and preparation of a document encapsulating research leading to a thesis proposition. Successful completion of the course, which includes approval of the thesis document, is a prerequisite for advancement into ARCH 8912 Independent Design Thesis.

ARCH 8912 Independent Design Thesis

Fall. 9 credits. Prerequisites: ARCH 8911, 5116.

An independent design project on a topic selected and developed by the student and researched in ARCH 8911. Marking the transition between academic and professional practices, the thesis project is an opportunity for each student to define an individual position with regard to the discipline of architecture.

ARCH 8913 Design C: ADR Project

Summer. 9 credits. Staff.

Development of a design project in the student's territory of investigation.

Elective Design Courses**ARCH 1103-1104 Elective Design Studio**

1103, fall; 1104, spring. 6 credits each semester. Prerequisite: nonarchitecture students; for ARCH 1103, permission of instructor; for ARCH 1104, ARCH 1103 and permission of instructor. Staff.

ARCH 2100, 3100, 4100, 5100 Elective Design Studio

Fall, spring, or summer. 6 credits. For transfer students and students who are not architecture majors at Cornell. Prerequisite: permission of instructor. Each student is assigned to a class of appropriate level. Staff.

Nonsequence design used as temporary placement of transfer students, non-Cornell architecture students, off-campus foreign programs for third-year students (summer and Rome), and for incompletes in design sequence. In some cases student must petition to convert elective design into sequence design.

ARCH 5103 Design IXa

Fall, spring, or summer. 6 credits. Limited to department students. Prerequisites: ARCH 4102 and passing, but nonadvancing, grade in ARCH 5101.

Structured studio for those needing to retake ARCH 5101. The course operates within the fourth-year design studios.

ARCH 5104 Design Xa

Fall, spring, or summer. 6 credits. Limited to department students. Prerequisite: ARCH 5103 and passing, but nonadvancing, grade in ARCH 5902.

A structured studio for those needing to take an alternative to design thesis. This course operates within the fourth-year design studio.

Related Courses and Seminars**ARCH 1110 Introduction to Architecture: Design Studio**

Summer. 3 credits. Open to non-architecture majors in college, high school students in 11th and 12th grades, and any individuals with a minimum of a high school diploma interested in exploring the field of architecture. S-U or letter grades. Not offered every year. Staff.

Designed to introduce students to ideas, principles, and methods of solving architectural problems in a studio setting. Through a graduated sequence of exercises culminating in a major semester project, students explore the architectural concepts of space, form, function, and technology. Instruction is via highly personalized critiques of individual student work by assigned department faculty members, as well as periodic reviews of the group by invited

faculty and guest critics. The grade is based on the overall performance in the studio with special emphasis on the quality of a major studio project.

[ARCH 1111 Concentration in Architecture: Design Studio

Summer only. 3 credits. Subject to enrollment. Prerequisite: non-architecture students. Not offered 2009-2010. Staff.

Designed to introduce students to ideas, principles, and methods of solving architectural problems in a studio setting. Through a graduated sequence of exercises culminating in a major term project, students explore the interrelationship of the architectural concepts of space, form, function, and technology. Instruction includes critiques of individual student work by department faculty, as well as by periodic reviews by guest critics.]

ARCH 3103 Special Problems in Architectural Design

Fall or spring. Variable credit; max. 3.

Does not count for design sequence credit. Prerequisite: permission of instructor and approved independent study form. Staff.

Independent study.

ARCH 3106 Praxis: Community Design Workshop (also ARCH 6106)

Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year.

Workshop-based, hands-on course directed to underserved local and global communities that seek to improve the quality of life for all citizens. It is an interdisciplinary, service-learning course that challenges the usual definition and separation of practice and theoretical research. Services are provided collaboratively to not-for-profit agencies, civic and governmental groups, as well as community-action groups to support sustainable design solutions. The course teaches professional work proficiency, and emphasizes teamwork as well as written, verbal, and graphic communication skills to negotiate the public realm.

ARCH 3113 Furniture Design

Fall or spring. 3 credits. Limited enrollment. Students who wish to earn arch visual representation credit must enroll in sec 01; arch technology credit, sec 02; and in-college elective credit, sec 03. Prerequisite: permission of instructor. Not offered every year. G. Hascup.

Explores the history, design, and materiality of furniture. Analyses of materials and joinery-connective systems are developed in parallel with ergonomic restraints. Design transformation occurs through cycles of conceptual alternatives (models and drawings), increasing in scale as the idea evolves. Full-scale prototypes and detailed tectonic drawings are required on three pieces.

ARCH 3117 Contemporary Italian Culture

Fall or spring. Variable credit; max. 3. Prerequisite: Rome Program participants. Staff.

Provides a broad view of the culture and social structure of Italy, drawing from Italian literature, history, and current events.

ARCH 5110 Thesis Proseminar

Fall and spring. 2 credits. Prerequisite: ARCH 4101. ARCH 5110 is a prerequisite for ARCH 5902 Design X Thesis. Failure to earn grade of C in ARCH 5110 requires automatic registration in ARCH 5104 Design Xa—an option studio. Staff.

Lectures, seminars, and independent research leading to the production of the student's thesis program. General instruction in the conceiving, programming, and development of a thesis.

ARCH 5201 Professional Practice

Fall or spring. 3 credits. Staff.

Examination of organizational and management theories and practices for delivering professional design services. Includes a historic overview of the profession and a review of the architect's responsibilities from the pre-contract phase through cost estimating and specifications to construction. Application of computer technology in preparing specifications.

ARCH 5202 Professional Seminar

Fall or spring. 3 credits. Prerequisite: ARCH 5201. Staff.

Visits to public and private agencies and architectural firms. Discussions relative to the various aspects of each firm's practice and the identification of agency roles.

ARCH 5203 Curricular Practical Training

Fall or spring. 1 credit. Open to B. Arch. and M. Arch. students only. Approved independent study form required. S-U grades only.

Independent study promotes an understanding of cultural differences within architectural practice. Course project involves writing a 10-page paper relating the experience of the internship to one or more texts approved by the instructor. Course may be taken more than once, but a maximum of 1 credit may be used to fulfill the in-college "free elective" distribution requirement. Students with summer internships enroll in the course during the spring semester prior to the internship and after obtaining an internship offer. Students with part-time fall or spring internships enroll in the course immediately after obtaining an internship offer.

ARCH 6105 Special Problems in Design

Fall and spring. Variable credit; max. 3.

Does not count toward design sequence credit. Prerequisite: permission of instructor. Staff.

Independent study.

ARCH 6106 Praxis: Community Design Workshop (also ARCH 3106)

Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year.

For description, see ARCH 3106.

ARCH 6110 Graduate Design Seminar

Fall. 3 credits. Intended for, but not limited to, graduate students in Architectural Design and Urban Design Program. Not offered every year. Staff.

A companion seminar developing themes explored in ARCH 7111.

ARCH 6111–6112 Urban Housing Developments

6111, fall; 6112, spring. 3 credits each semester. Prerequisite: fourth- and fifth-year students in architecture and graduate students; permission of instructor. Not offered every year. Staff.

ARCH 6113 Transportation

Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

The effect of various transportation forms on the environment is considered from the perspectives of architects, engineers, planners, and human ecologists. Readings and discussions of past, current, and future transportation modes focus on aesthetic and physical aspects.

ARCH 6114 Low-Cost Housing

Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

Aspects of low-cost housing involving engineering technology, architecture, physical planning, economics, and sociology.

Architectural Theory**ARCH 1300 An Introduction to Architecture: Lectures**

Summer. 3 credits. Open to non-architecture majors in college, high school students in 11th and 12th grades, and anyone with minimum of a high school diploma interested in exploring the field of architecture. S–U or letter grades. Not offered every year. Staff.

Survey course that covers the many facets of architecture: history, design principles, preservations, landscape architecture, building technology, and cultural factors. Course format comprises lectures, demonstrations, films, and field trips. Evaluation is based on quizzes and a final exam.

ARCH 1301 An Introduction to Architecture

Fall. 3 credits. Open to out-of-department students only. ARCH 1301 is not a prerequisite for ARCH 1302. Staff.

Intended to familiarize non-architecture students with the art and science of architecture. The fundamentals of plan, section, and elevation, the primary elements that comprise an architectural form; basic organizational principles; the ways in which we perceive architectural space; and the various concepts of function in relation to form will be included among the topics to be covered, using examples from numerous times and cultures as well as from contemporary Cornell campus.

ARCH 2301 Architectural Analysis I

Fall. 2 credits. Corequisite: for architecture students, ARCH 2101. Staff.

Introduction to analysis of the object of study in the interest of broadening one's understandings of the ways in which architecture can connote and denote meanings.

ARCH 2302 Architectural Analysis II

Spring. 2 credits. Corequisite: for architecture students, ARCH 2102. Staff.

Advanced analytical studies focusing on complex architectural spaces, objects, images, and representations.

ARCH 3304 Column, Wall, Elevation, Facade: A Study of the Vertical Surface in Architecture (also ARCH 6304)

Fall or spring. 3 credits. Prerequisite: third-year students and above. J. Wells.

Field and figure relationships (interrelation of parts dominated by the general character of the whole) are the general themes for studying numerous issues relevant to the design of elevations and facades. The first part of the semester is a lecture/seminar format. Students are required to research and present a paper for discussion. In the latter part of the semester, students do exercises to demonstrate their understanding of the issues addressed.

ARCH 3307 Special Investigations in the Theory of Architecture I

Fall or spring. Variable credit, max. 3. Prerequisite: permission of instructor and approved independent study form. Staff. Independent study.

ARCH 3308 Special Topics in the Theory of Architecture I

Fall or spring. 3 credits. Prerequisite: ARCH 2301–2302 or permission of instructor. Not offered every year. Staff. Topic TBA.

ARCH 3309 Elements, Principles, and Theories in Japanese Architecture

Spring. 3 credits. Not offered every year. L. Mirin.

Examination of Japanese architecture (buildings and gardens) and their contexts: landscapes, settlements, and cities. The course is addressed to those interested in Japanese architecture as a manifestation of Japanese culture and as a subject for analysis. Emphasis is on underlying concepts, ordering principles, formal typologies, space and its representation, perceptual phenomena, and symbolic content. Readings focus on theoretical treatments of these aspects by Japanese and western writers.

ARCH 4302 Theory of Architecture

Fall or spring. 3 credits. Prerequisite: upper-level students. Not offered every year. Staff.

Development of urban form, urban intervention, contextualism, ideal cities, historic new towns, streets, piazzas, fortifications, public buildings and social housing types, site planning, and transportation.

ARCH 4305 Architecture and Representation

Fall or spring. 3 credits. Prerequisite: degree candidates in architecture; successful completion of ARCH 2301–2302. Not offered every year. Staff.

Study of architecture as it functions as a representational art, referring to its past while inferring its present.

ARCH 5301 Theories and Analyses of Architecture I

Fall. 3 credits.

Introduces students to influential critical and creative themes in modern architecture. Topics cover influential 20th-century discourses and practices prior to the 1960s, the questions and contexts that they engage, and their implications for contemporary thinking and design. Discussions and assignments aim at developing critical and graphical readings of both works and writings.

ARCH 5302 Theories and Analyses of Architecture II

Spring. 3 credits. Prerequisite: ARCH 5301. Continuation of ARCH 5301 focusing on themes in architectural discourse, design, and inquiry from the 1960s to the present, and their creative/critical implications.

ARCH 6301 Design Research

Fall. 3 credits. Staff. Introduction to themes of inquiry in contemporary architecture, including critical motives in research, topical “problems,” and materials and tactics of investigation.

ARCH 6304 Column, Wall, Elevation, Facade: A Study of the Vertical Surface in Architecture (also ARCH 3304)

Fall or spring. 3 credits. Prerequisite: third-year students and above. J. Wells. For description, see ARCH 3304.

ARCH 6305 Theory and Criticism in Architecture

Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

Inquiry into the fundamental principles of architectural criticism in theory and practice, with emphasis on the structures of criticism in the 20th century.

ARCH 6307 Special Investigations in the Theory of Architecture II

Fall or spring. Variable credit; max. 4. Prerequisite: permission of instructor and approved independent study form. Staff. Independent study.

ARCH 6308 Special Topics in the Theory of Architecture II

Fall or spring. 3 credits. Prerequisite: ARCH 5301–5302, permission of instructor. Not offered every year. Staff. Topic TBA.

Architecture, Culture, and Society**ARCH 3402 Architecture as a Cultural System (also ARCH 5402)**

Fall or spring. 3 credits. Can substitute ARCH 4405 or 4407 by permission of instructor. B. MacDougall.

What have been the major issues in the theory and practice of architectural design through time and across cultures, and how is aesthetic judgment related to more general systems of ordering within a particular society or group? This course draws on concepts, methods, and findings from the broad field of cultural anthropology to address these questions. Case studies and examples are drawn from a wide range of architectural traditions around the world for which there is significant ethnographic literature, with special emphasis on sub-Saharan Africa, India, and the United States. Topics include the ideational and formal relationships between folk and monumental traditions in complex societies; the structure of the ideal social order and its refraction in the material world; cosmological models and architectural form; geometries of non-Western traditions; and the relationship between indigenization and culture change.

ARCH 3409 Undergraduate Investigations in Architecture, Culture, and Society

Fall or spring. Variable credit; max. 3. Prerequisite: permission of instructor and approved independent study form. B. MacDougall. Independent study.

ARCH 4405 Architecture and the Mythic Imagination

Fall. 3 credits. Prerequisite: ARCH 3402 or permission of instructor. Not offered every year. B. MacDougall.

ARCH 4407 Architectural Design and the Utopian Tradition

Fall. 3 credits. Prerequisite: ARCH 3402 or permission of instructor. Not offered every year. Staff.

ARCH 4408-4418 Special Topics in Architecture, Culture, and Society

Fall and spring. 3 credits each semester. Prerequisite: permission of instructor. B. MacDougall.

Topic TBA.

ARCH 5402 Architecture, Culture, and Society

Spring. 3 credits.

What have been the major issues in the theory and practice of architectural design through time and across cultures, and how is aesthetic judgment related to more general systems of order within a particular society or group? This course draws on concepts, methods, and findings from the broad field of cultural anthropology to address these questions. Case studies and examples are drawn from a wide range of architectural traditions around the world for which there is significant ethnographic literature, with special emphasis on sub-Saharan Africa, India, and the United States. Topics include the ideational and formal relationships between folk and monumental traditions in complex societies; the structure of the ideal social order and its refraction in the material world; cosmological models and architectural form; geometries of non-Western traditions; and the relationship between indigenization and culture change.

ARCH 6401-6402 Architecture in Its Cultural Context I and II

6401, fall; 6402, spring. 4 credits each semester. Prerequisite: permission of instructor. Not offered every year. B. MacDougall.

ARCH 6409 Graduate Investigations in Architecture, Culture, and Society

Fall or spring. Variable credit; max. 4. Prerequisite: permission of instructor and approved independent study form. B. MacDougall.

Independent study.

Visual Representation**ARCH 1501 Drawing I: Freehand Drawing**

Fall. 2 credits. Prerequisite: department student or permission of instructor. Staff. Freehand drawing with emphasis on line as a means of visualizing form and space in architecture.

ARCH 1502 Drawing II: Drawing Systems

Spring. 2 credits. Prerequisite: ARCH 1501 or permission of instructor. Staff.

Concepts and methods of visualization and representational drawing systems used in architecture. Orthogonal projection, line weight, paraline projection, shade and shadow, and perspective.

ARCH 2503 Drawing III: Digital Media in Architecture

Fall or spring. 2 credits. Prerequisite: ARCH 1502 or permission of instructor. Letter grades only.

Introduction to two- and three-dimensional digital media in architecture and its potential for visualization, representation, and analysis.

ARCH 4500 Architectural Publications

Fall or spring. Variable credit; max. 3. May be repeated for credit. Not offered every year. Staff.

Colloquy and practicum on issues related to the production of an architectural journal, as well as other theoretical and practical production issues related to the exchange of architectural ideas. Exercises cover both theoretical as well as hands-on aspects of architectural publication.

ARCH 4508 Special Investigations in Visual Representation

Fall or spring. Variable credit; max 3. Prerequisites: permission of instructor and approved independent study form. Staff.

Independent study.

ARCH 4509 Special Topics in Visual Representation I

Fall or spring. 3 credits. Prerequisite: ARCH 1501, 1502, and 2503, or permission of instructor. Staff.

Topics TBA.

ARCH 5511 Techniques in Visual Representation I: Freehand and Analytical Drawing

Fall. 3 credits.

Focuses on hand drawing and sketching as vehicles for design thinking and perception. Observational, analytical, and transformational exercises develop creative proficiency in freehand line drawing and orthographic projection.

ARCH 5512 Techniques in Visual Representation II: Analog/Digital Constructed Drawing

Spring. 3 credits. Prerequisite: ARCH 5511 or approved equivalent.

Develops understanding of, and proficiency in, projective drawing, including paraline and perspective representation in both analog and digital forms. Students are also introduced to a variety of digital representation applications, including modeling, rendering, and animation.

ARCH 6508 Special Investigations in Visual Representation II

Fall or spring. Variable credit; max. 4. Prerequisites: permission of instructor and approved independent study form. Staff.

Independent study.

ARCH 6509 Special Topics in Visual Representation II

Fall or spring. 3 credits. Prerequisite: ARCH 5511-5512 or permission of instructor. Staff.

Topics TBA.

Architectural Science and Technology**Structures****ARCH 2603 Structural Concepts**

Fall. 4 credits. Prerequisite: MATH 1110 or approved equivalent. M. Cruvellier. Fundamental concepts of structural behavior. Statics and strength of materials. Introduction to and analysis of simple structural systems.

ARCH 2604 Structural Elements

Spring. 3 credits. Prerequisite: ARCH 2603. J. Ochshorn or staff.

Concepts and procedures for the design of individual structural components (e.g., columns, beams) in steel, concrete, and timber construction.

ARCH 3603 Structural Systems

Fall or spring. 3 credits. Prerequisite: ARCH 2604. M. Cruvellier.

Concepts and procedures for the design of overall structural framing systems in steel, concrete, and timber construction.

ARCH 3604 Vertigo Structures (also ARCH 6604)

Fall or spring. 3 credits. Prerequisite: ARCH 3603 or equivalent. Limited enrollment. Not offered every year. M. Cruvellier.

ARCH 3605 Bridge Design (also ARCH 6605)

Fall or spring. 3 credits. Limited enrollment. Prerequisite: ARCH 3603 or equivalent. Not offered every year. M. Cruvellier.

The major visual impact of bridges on the built environment cannot be denied. And yet, during the past century, architects have virtually abandoned their historical role in the design of these structures. Engineers, on the other hand, have claimed bridge design as their responsibility and have hailed it as evidence of structural art. Are the basic principles of bridge design such that this situation makes sense for our society? Or is a rethinking of the manner in which bridges are designed called for? Students examine and experiment with the design of bridge structural forms, not only in terms of what is technically feasible but also, with equal emphasis, in the context of aesthetic, historical, and social considerations. Weekly meetings include lectures, discussion seminars, and studio-type design reviews.

ARCH 4603 Special Topics in Structures

Fall or spring. 3 credits. Limited to 30 students. Prerequisites: ARCH 2603, 2604, and 3603 or permission of instructor. Not offered every year. Staff.

Topics TBA.

ARCH 4609 Special Investigations in Structures

Fall or spring. Variable credit; max. 3. Prerequisite: permission of instructor and approved independent study form. Staff.

Independent study.

ARCH 5603 Structural Concepts

Fall or spring. 3 credits. Prerequisite: M. Arch. 1 students or permission of instructor. M. Cruvellier.

For description, see ARCH 2603.

ARCH 5604 Structural Elements

Fall or spring. 3 credits. Prerequisite: M. Arch. 1 students or permission of instructor. J. Ochshorn.

For description, see ARCH 2604.

ARCH 6603 Structural Systems

Fall or spring. 3 credits. Prerequisite: M. Arch. 1 students or permission of instructor. M. Cruvellier.

For description, see ARCH 3603.

ARCH 6604 Vertigo Structures (also ARCH 3604)

Fall or spring. 3 credits. Prerequisite: ARCH 5603 or equivalent. Limited enrollment. Not offered every year. M. Cruvellier.

For description, see ARCH 3604.

ARCH 6605 Bridge Design (also ARCH 3605)

Fall or spring. 3 credits. Limited enrollment. Prerequisite: ARCH 3603 or equivalent. Not offered every year. Staff.

For description, see ARCH 3605.

Construction**ARCH 2602 Building Technology, Materials, and Methods (also ARCH 5602)**

Fall. 3 credits. J. Ochshorn.

Building construction is examined from the following standpoints: life safety (construction types, occupancy, assemblies, egress); accessibility (ramps, doors, etc.); sustainability; conveying systems (stairs, elevators, escalators); structural materials (properties, manufacturing strategies, typical applications, and connections); envelope theory (insulation, condensation, vapor and air barriers, pressure-equalization, movement, tolerances); cladding systems (masonry, precast, metal, glass); interior systems (walls, floors, and ceilings); and technical documentation (detail drawings).

ARCH 3607 Working Drawings (also ARCH 6607)

Fall or spring. 3 credits. Prerequisite: ARCH 2602 or equivalent. Limited enrollment. Not offered every year. J. Ochshorn.

ARCH 4604 Special Investigations in Construction

Fall or spring. Variable credit; max. 3. Prerequisite: permission of instructor and approved independent study form. Staff.

Independent study.

ARCH 4605 Special Topics in Construction

Fall or spring. 3 credits. Limited to 30 students. Prerequisite: ARCH 2602 or permission of instructor. Not offered every year. Staff.

Topics TBA.

ARCH 5602 Building Technology, Materials, and Methods (also ARCH 2602)

Fall. 3 credits. Prerequisite: M.Arch. I students or permission of instructor. J. Ochshorn.

For description, see ARCH 2602.

ARCH 6607 Working Drawings (also ARCH 3607)

Fall or spring. 3 credits. Prerequisite: ARCH 2602 or equivalent. Limited enrollment. Not offered every year. J. Ochshorn.

Environmental Systems and Conservation**ARCH 2601 Environmental Systems I—Site Planning**

Spring. 3 credits. Staff.

Basic principles involved in design in the outdoor environment. A brief historical perspective. A development of inventory including grading and drainage. Foundations, surfacing, and construction.

ARCH 3601 Environmental Systems II—Thermal Environmental Systems

Fall. 3 credits. Prerequisites: ARCH 2601. Corequisite: ARCH 3101. Letter grades only. Staff.

The first semester of this yearlong course addresses the design of the indoor thermal environment, including the appropriate application of building envelope materials and assemblies, and an introduction to the principles of sustainability. Beginning with the basics of human thermal comfort, followed by the concept and practice of solar heating, passive cooling, indoor air quality, and human health, students will learn how to shape the form of a building to respond to climate and the needs of an occupant. In the second half of the semester, students address the design of mechanical, electrical, and plumbing systems, including heating, ventilation and air-conditioning (HVAC) equipment, vertical transportation, communication, security, and fire protection systems.

ARCH 3602 Environmental Systems III—Building Systems Integration

Spring. 3 credits. Prerequisites: ARCH 2602, 2603, 3101 and 3601. Corequisite: ARCH 3102. Letter grades only. Staff.

The second semester of this yearlong course addresses the design of the visual and acoustical environments of buildings. Beginning with the basics of vision, followed by the concept and practice of daylighting, electric lighting sources, and human health, this course will provide students with a working understanding of light and sound as architectural media.

The objective of this yearlong course is to engage students to produce a comprehensive architectural project based on a building program and site. To do this, students will be required to select a design from a prior design studio project to develop in this course. In the comprehensive design project, students will be required to demonstrate an understanding of structural systems, environmental systems, building envelope systems, life-safety provisions, wall sections, building assemblies and the basic principles of sustainability.

ARCH 4601 Ecological Literacy and Design (also DEA 4220)

Spring. 3 credits. Letter grades only. Cost of field trips: approx. \$25. J. Elliott.

Lecture/seminar course for advanced (junior or senior) students interested in learning about the effects of designing the built environment of the biophysical world. Course objectives are to develop sensitivities to environmental issues, construct conceptual frameworks for analysis, and demonstrate how ecological knowledge can be applied to the practice of design through participatory approaches to learning. Visit <http://courses.cit.cornell.edu/dea4220/ARCH>.

ARCH 4618 Special Investigations in Environmental Systems and Conservation

Fall or spring. Variable credit; max. 3. Prerequisite: permission of instructor and approved independent study form. Staff.

Independent study.

ARCH 4619 Special Topics in Environmental Systems and Conservation

Fall or spring. 3 credits. Limited to 30 students. Prerequisites: ARCH 2601, 3601, and 3602 or permission of instructor. Not offered every year. Staff.

Topics TBA.

ARCH 6601 Environmental Systems II—Thermal Environmental Systems

Fall. 3 credits. Prerequisite: second-year M. Arch. I students or permission of instructor. Letter grades only. Staff.

For description, see ARCH 3601.

ARCH 6602 Environmental Systems III—Building Systems Integration

Spring. 3 credits. Prerequisite: second-year M. Arch. I students or permission of instructor. Letter grades only.

For description, see ARCH 3602.

Computer Applications**ARCH 3702 Imaging and the Electronic Age**

Fall or spring. 3 credits. For undergraduate non-computer scientists. Not offered every year. D. Greenberg.

Historical technological advances that created major paradigm shifts for communications as well as advances in computer technology are presented. Technical fundamentals of computer graphics capabilities are emphasized. The latter half of the course covers the effect of these scientific advances on many discipline-specific areas including architecture, art and animation, photography and the film industry, medicine, engineering design, the corporate structure, and education. The course is heavily supplemented with pictorial content consisting of slides, movies, and live interactive demonstrations.

ARCH 3704 Computer Graphics I (also CS 4620)

Fall. 4 credits. Prerequisite: CS/ENGRD 2110. Staff.

For description, see CS 4620.

ARCH 4706 Special Topics in Computer Applications

Fall or spring. 3 credits. Limited to 30 students. Prerequisite: ARCH 3704 or permission of instructor. Not offered every year. Staff.

Topics TBA.

ARCH 4707-4708 Special Projects in Computer Graphics

Not offered every year.

ARCH 4709 Advanced Computer Graphics: Virtual Reality (also ARCH 6709)

Fall. 3 credits. Prerequisites: introductory computer graphics or computer science course, or permission of instructor; upper-level undergraduate or graduate standing. Not offered every year. H. Richardson.

Explores the role of synthetic imaging and computer graphics in architectural design. The first half of the course examines the new possibilities that information technologies offer for multimedia visualization of architecture, from abstract conceptual drawings, to sketching, photorealistic rendering, and multimodal representation, including motion and sound. The second half explores the uses of information technologies to model and simulate the creative design

process. These explorations include developing a library of design ideas as building blocks for design; creating multimodal, multidimensional, immersive, virtual environments; interactive transformation and synthesis of design concepts; and "reverse architecturing" of canonical works. The emphasis of this course is on concepts as well as methods and techniques of computer graphics and their application to simulating the creative design process in architecture.

Graduate Courses

ARCH 6709 Advanced Computer Graphics: Virtual Reality (also ARCH 4701)

Fall. 3 credits. Prerequisite: introductory computer graphics or computer science course or permission of instructor; upper-level undergraduate or graduate standing. H. Richardson.

For description, see ARCH 4709.

ARCH 7701-7702 Architectural Science Laboratory

7701, fall; 7702, spring. 6 credits each semester. Prerequisite: architectural science graduate students. D. Greenberg.

Projects, exercises, and research in the architectural sciences.

ARCH 7903-7904 Thesis or Research in Architectural Science

7903, fall; 7904, spring. Variable credit; max. 12. Prerequisite: architectural science graduate students. Staff.

Independent study.

Architectural History

The history of the built domain is an integral part of all aspects of the architecture curriculum, from design and theory to science and technology. Incoming students take ARCH 1801-1802 in the first year, and three additional courses from the 3800-3819 series, preferably in the third and fourth years. Seminars are intended for advanced undergraduate and graduate students and do not satisfy undergraduate history requirements. Courses with the same number may be taken only once to satisfy history of architecture or in-college requirements.

Sequence Courses

ARCH 1801 History of Architecture I

Fall. 3 credits. Requirement for first-year architecture students; open to all students in other colleges interested in the history of the built domain. Staff.

The history of the built environment as social and cultural expression from the earliest to more recent times. Themes, theories, and ideas in architecture and urban design are explored, beginning with the earliest written records.

ARCH 1802 History of Architecture II

Spring. 3 credits. Requirement for first-year architecture students; open to all students in other colleges interested in the history of the built domain; may be taken independently of ARCH 1801. Staff.

The history of the built environment as social and cultural expression from more recent times to the present. Architecture and urban design themes, theories, and ideas are addressed in greater detail leading to the present time.

Directed Electives

ARCH 3800 History of Theory

Fall or spring. 3 credits. Prerequisites: ARCH 1801-1802 or permission of instructor. Not offered every year. Staff.

This course, in which classroom discussion and debate play a central role, explores the history of important theoretical issues involving art and architecture. The readings, which span from the Greeks to today, focus on more than just questions of aesthetics and include theories of ethics, origins, imagination, nature, society, and pedagogy.

ARCH 3801 From Utopia to the Ghetto: Renaissance Urban Form

Fall or spring. 3 credits. Prerequisites: ARCH 1801-1802 or permission of instructor. Not offered every year. M. Lasansky.

Significant developments in European urban design from 1300 to 1600. Particular attention is given to Italy and Spain. Focuses on a series of case studies: entire towns, specific urban spaces, and individual building types. Weekly discussions contextualize the city within a larger cultural framework. This course considers how civic, economic, social, political, legislative, technical, and material concerns have had a significant impact on the form, function, and patronage of these places, spaces, and structures. The relevance of Renaissance theory to contemporary practice is also emphasized through the discussion of several 20th-century urban plans and built projects.

ARCH 3802 The Cinematic City

Fall. 3 credits. Prerequisite: ARCH 1801-1802 or permission of instructor. Not offered every year. M. Lasansky.

Examines the relationship between cinematic forms of mass media and architecture. Explores the representation, perception, and understanding of architecture as it has been mediated by various cinematic genres including film, television, and documentaries. Considers how cinema has been deployed as a tool in architectural production, how it has influenced the experience and design of space, the extent to which it has been used as a vehicle for critical commentary on the urban condition, and the way it is imbedded in the historical development of architecture and urbanism.

ARCH 3803 The Construction of Modern Life: The Politics of Memory and the Commodification of Architecture

Fall or spring. 3 credits. Prerequisite: ARCH 1801-1802 or permission of instructor. Not offered every year. M. Lasansky.

Examines the complex relationship between the built environment, the construction and definition of cultural heritage, collective memory and civic identity, and the commodification or commercial celebration of specific buildings, sites, and urban events. Focuses on late 18th-, 19th-, and 20th-century Europe. Particular attention is awarded to the discourse surrounding the restoration of buildings (and figures such as Ruskin, Viollet-le-Duc, and Giovannoni); political agendas guiding restoration and urban renewal projects; newly defined venues of modern urban spectacle (e.g., the World's Fair, department stores, morgues, and panoramas); and the role played by tourism in the commodification of local and foreign sites.

ARCH 3804 The Urban Landscape of Renaissance Rome: 1450 to 1600

Fall or spring. 3 credits. Prerequisites: ARCH 1801-1802 or permission of instructor. Not offered every year. M. Lasansky.

Exploration into the urban morphology, architecture, and civic life of Renaissance Rome. The city was a thriving center for architectural practice. It drew practitioners from throughout the peninsula and served as an important theoretical model for architects elsewhere. The course surveys the important issues, individuals, and building projects of the city between 1450 and 1600 with particular emphasis on the intellectual and physical rediscovery and re-appropriation of Antiquity; the role of the Vatican with its large population of pilgrims, tourists, resident church officials, foreign bankers, and dignitaries that made specific demands of the built environment; and the unique topography and natural resources of the city's location. The last portion of the course addresses the legacy of the Renaissance during the period of Italian unification and the Fascist regime.

ARCH 3805 Magnificent Utility—Architecture and the Arts of Persuasion

Fall or spring. 3 credits. Prerequisites: ARCH 1801-1802 or permission of instructor. Not offered every year. C. Otto.

Architects put revolutionary attitudes about form, space, light, and the arts into practice during the course of the 17th century. Focusing on the urban centers of Rome and Paris and the cultural landscapes of Spain, England, and Central Europe, this course explores how architecture, urban design, and the arts were employed to promote state and church.

ARCH 3806 The Architecture of India and Its Interpretation

Spring. 3 credits. Not offered every year. B. MacDougall.

Surveys the architectural record of ancient and medieval India with an emphasis on stupa and temple traditions. Devotes attention to European efforts to write a Western-style architectural history for India and to the British fascination with explaining Indian ethnology and history over two centuries. Attempts to evaluate the claim made by the historian James Fergusson that architecture provided the basis for reconstructing an imperfectly known Indian history. Also examines the notion that scholarly enterprises were closely entwined with strategies for domination. To this end, students read 19th-century firsthand reports on architecture in antiquarian English-language journals alongside more modern accounts. They are compared with indigenous architecture writings that were often unacknowledged by Europeans.

ARCH 3807 19th Century: Tales of the City

Fall or spring. 3 credits. Prerequisite: ARCH 1801-1802 or permission of instructor. Not offered every year. M. Woods.

Focuses on 19th-century cities as settings for modernisms and modernities, new visions and experiences of modern life. The relationship between urbanism and creativity that emerges during the 19th century engages students in Berlin, Havana, Miami, London, Bombay, Paris, Harlem, and other cities.

Issues of center and periphery, nation and locality, capital and colony also emerge. Urban pleasures and dangers for men, women, and the other as revealed through histories of the built environment but also through literature, painting, photography, and film are examined.

ARCH 3808 Modernism

Fall or spring. 3 credits. Prerequisites: ARCH 1801–1802 or permission of instructor. Not offered every year. C. Otto. Precursors and proponents of the modern movement from the late 19th century into the 1940s are considered in this course. The cultural intents of the modern are examined in architectural and urban design for individuals, groups, and institutions, from Mies van der Rohe, Le Corbusier, and Frank Lloyd Wright to de Stijl, the Bauhaus, and design education. Attention is paid to the politics of design serving the state in the 1930s.

ARCH 3809 Architecture, Revolution, and Tradition

Fall or spring. 3 credits. Prerequisites: ARCH 1801–1802 or permission of instructor. Not offered every year. C. Otto. From early 18th to early 19th century, European society underwent profound change. Political absolutism—the doctrine of unlimited governmental control—was challenged; enlightenment attitudes—commitments to human reason, science, and education—gained ascendancy. This course considers architectural and urban design in these times of tumult. It begins with efforts to foment architectural revolution within inherited traditions and ends with attempts to establish design traditions within revolutionary settings.

ARCH 3810 American Architecture and Building I (also AMST 3810)

Fall or spring. 3 credits. Prerequisites: ARCH 1801–1802 or permission of instructor. Not offered every year. M. Woods. Review of architecture, building, and responses to the landscape from the prehistoric period to the Civil War. Architecture and building as social and collaborative arts are emphasized and thus the contributions of artisans, clients, and users as well as professional architects and builders are examined. The architectural expressions of Native Americans, African Americans, women, and others are treated in addition to those of European colonists and settlers.

ARCH 3811 American Architecture and Building II (also AMST 3811)

Fall or spring. 3 credits. Prerequisites: ARCH 1801–1802 or permission of instructor. Not offered every year. M. Woods. Continuation of ARCH 3810 but may be taken independently. An account of American architecture, building, and responses to the environment from the post–Civil War period to the present day. Particular attention is paid to the processes of industrialization, professionalization, and urbanization as well as to the manifestations of gender, class, race, and ethnicity in the built and architectural environments.

ARCH 3812 Modern Architecture on Film

Fall or spring. 3 credits. Prerequisites: ARCH 1801–1802 or permission of instructor. Not offered every year. M. Woods.

Exploration of certain themes deemed critical to modern architecture and urbanism through their representation in both commercial and avant-garde films from the medium's birth until the present day. The focus varies each semester with particular emphases to include the modern house and housing, the modern city, technology and visions of the future, and finally the image of the architect. Representations of these themes in other forms such as painting, photography, theater, literature, and advertising also are examined. The course includes selected readings in modern architecture and film, screenings in class, class discussions, presentations, and papers.

ARCH 3813 The Cumulative City

Fall or spring. 3 credits. Prerequisites: ARCH 1801–1802 or permission of instructor. Not offered every year. C. Otto. Well-established cities were transformed by radical and unimagined change in the 19th and 20th centuries. Politics and economies were recast, population exploded, and new technologies reshaped transportation, communication, and building. This course explores transformation historically in the cumulative city, focusing on specific cities in America and Europe, Africa and Asia. The cultural context of each city is examined to understand how it changed and how meanings became associated with evolving urban forms.

ARCH 3815 History of the Present—Contemporary Architecture and Urbanism

Fall or spring. 3 credits. Prerequisite: ARCH 1801–1802 or permission of instructor. C. F. Otto. Theory and practice in architecture and urbanism are investigated from later Modernism to contemporary positions. Built work, theoretical texts and graphics, and the nature of design practice in locations worldwide (such as the United States and the Pacific Rim) raise issues of globalization and the specificity of place and cultural identity. By engaging the immediate past using methods of cultural and design history, the course problematizes the relationship (and relevance) of history to architectural practice and experience.

ARCH 3816 Special Topics in the History of Architecture and Urbanism

Fall or spring. 3 credits. Prerequisites: ARCH 1801–1802 or permission of instructor. Not offered every year. Staff. Topics TBA.

ARCH 3817 Special Topics in the History of Architecture and Urbanism

Fall or spring. 3 credits. Prerequisites: ARCH 1801–1802 or permission of instructor. Not offered every year. Staff. Topics TBA.

ARCH 3818 Special Topics in the History of Architecture and Urbanism

Fall or spring. 3 credits. Prerequisites: ARCH 1801–1802 or permission of instructor. Not offered every year. Staff. Topics TBA.

ARCH 3819 Special Topics in the History of Architecture and Urbanism

Fall or spring. 3 credits. Prerequisites: ARCH 1801–1802 or permission of instructor. Not offered every year. Staff. Topics TBA.

ARCH 3820 The Topography and Urban History of Rome in Antiquity and the Middle Ages

Fall or spring. 3 credits. Rome Program only. J. Gadeyne. Rome is a prisoner of its past. The entire city confronts the student with almost 30 centuries of urban and architectural history. This course intends to reconstruct the urban history of Rome from its origins through the Middle Ages (10th century BC–12th century AD). The purpose of this course will be to discover the layers of Rome, combining archaeology with literature, architecture, and urban history with art history. The goal is a thorough and direct knowledge of the Roman and Medieval urban landscape and the way this landscape has sometimes survived until today. Special attention will be given to Roman and Medieval building typology, both private and public, and the development of the urban infrastructure (street system, water supply, fortifications, etc.). Strong emphasis will be placed upon continuity, use/reuse, and transformation of buildings and spaces, etc. Every week one or two different “regions” will be explored that are typical for a particular moment of the urban history. Visits to sites outside Rome also will be used to address the issue of urban history in Italy in antiquity and the Middle Ages.

Special attention will be given to Roman and Medieval building typology, both private and public, and the development of the urban infrastructure (street system, water supply, fortifications, etc.). Strong emphasis will be placed upon continuity, use/reuse, and transformation of buildings and spaces, etc. Every week one or two different “regions” will be explored that are typical for a particular moment of the urban history. Visits to sites outside Rome also will be used to address the issue of urban history in Italy in antiquity and the Middle Ages.

ARCH 3904 Toward the Millennium

Fall or spring. 3 credits. Prerequisites: ARCH 1801–1802 or permission of instructor. Not offered every year. C. Otto. Theory and practice in architecture and urbanism are investigated from the 1950s to the present. From the Americanized International Style to the more recent internationalism of design attitudes, the immediate past is explored historically to probe the matrix of meanings associated with contemporary form, urbanism, and technology.

ARCH 5801 History of Architecture I

Fall. 3 credits. Staff. The history of the built environment as social and cultural expression from the earliest times to the beginning of the modern period is studied through selected examples from across the world. Themes, theories, and ideas in architecture and urban design are explored through texts, artifacts, buildings, cities, and landscapes.

ARCH 5802 History of Architecture II

Spring. 3 credits. Prerequisite: ARCH 5801 or approved equivalent. Staff. The history of the built environment as social and cultural expression from the modern period to the present day is studied through selected examples from across the world. Architecture and urban design themes, theories, and ideas are explored through texts, artifacts, buildings, cities, and landscapes.

Graduate Seminars in the History of Architecture and Urbanism

All topics for ARCH 6802 to 6819 TBA before the start of the semester.

ARCH 6800 State of the Discipline

Fall or spring. 4 credits. Staff.
This seminar will provide a survey of architectural historiography paying particular attention to the paradigm shifts of recent decades. Through the critical readings of important texts we will discuss the current state of the field while simultaneously reconsidering our position in it. The course will address how we apply theory to practice, develop research strategies that maximize methodological alliances, imbue the study of the past with contemporary relevance, and contribute as much to other disciplines as we borrow from them.

ARCH 6801 Foundations of the Discipline

Fall or spring. 4 credits. Staff.
Explorations of seminal positions that established the disciplinary praxis of the history of architecture and urbanism, based on case studies.

ARCH 6802 Seminar in Urban History

Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

ARCH 6803 Seminar in History of Theory

Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

ARCH 6804 Seminar in Italian Renaissance: Architecture, Politics, and Urbanism

Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. M. Lasansky.

ARCH 6805 Practicum

Fall or spring. 4 credits. Staff.
This course exercises history of architecture and urbanism's capacities for affecting contemporary events through critical associations with the past. The workshop culminates in an exhibition, publication, symposium, curricular initiative, or other public occasion. Enrollment of qualified graduate students from associated fields is encouraged.

[ARCH 6806 Seminar in 17th- and 18th-Century Architecture and Urbanism]

[ARCH 6808 Seminar in 20th-Century Architecture and Urbanism]

ARCH 6809 Seminar in History of Cities

Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

[ARCH 6810 Seminar in American Architecture, Building, and Urbanism]

[ARCH 6812 Seminar in 19th-Century Architecture, Building, and Urbanism]

ARCH 6816 Seminar in Special Topics in the History of Architecture and Urbanism

Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

ARCH 6817 Seminar in Special Topics in the History of Architecture and Urbanism

Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

ARCH 6818 Seminar in Special Topics in the History of Architecture and Urbanism

Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

ARCH 6819 Seminar in Special Topics in the History of Architecture and Urbanism

Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

Independent Study, Thesis, Dissertation

ARCH 2809 Undergraduate Independent Study in the History of Architecture and Urbanism

Fall or spring. Variable credit; max. 3. May not be taken by students in design to satisfy undergraduate history requirements. Prerequisite: permission of instructor. Staff.

Independent study for undergraduate students.

ARCH 4901 Undergraduate Thesis in the History of Architecture and Urbanism

Fall or spring. 4 credits. Prerequisite: B.S. honors candidates in history. Staff.

ARCH 7809 Graduate Independent Study in the History of Architecture and Urbanism

Fall or spring. Variable credit; max. 12. Prerequisite: permission of instructor. Staff.

Independent study for graduate students only.

ARCH 8920 M.A. Essay Research

Fall. 4 credits. Prerequisite: permission of instructor and approved independent study form. Staff.

Independent research for the M.A. essay.

ARCH 8921 M.A. Essay in the History of Architecture and Urbanism

Fall or spring. 6 credits. Staff.
Independent preparation of the M.A. essay.

ARCH 9901 Ph.D. Dissertation in the History of Architecture and Urbanism

Fall or spring. Variable credit; max. 12. Staff.
Independent study for the doctoral degree.

ART

P. Phillips, chair (224 Tjaden Hall, 255-3558); M. Ashkin, director of graduate studies; R. Bertoia, J. Locey, T. McGrain; E. Meyer, G. Page, M. Park, B. Perlus, J. Rickard, B. Spector, W. S. Taft, and visiting artists and critics.

Undergraduate Program

The curriculum in art is a program of study within the College of Architecture, Art and Planning, as well as other colleges at Cornell.

The undergraduate curriculum in art is an excellent background for a career in the

visual arts. Past graduates have found it also to be preparation for careers in applied art, although no specific technical courses are offered in such areas as interior design, fashion, or commercial art.

The undergraduate curriculum in art, leading to the degree of bachelor of fine arts, provides an opportunity for the student to combine a general liberal education with the studio concentration required for a professional degree. During the first four semesters, all students follow a common course of study designed to provide a broad introduction to the arts and a basis for the intensive studio experience of the last two years. Beginning with the third year, students concentrate in electronic imaging, painting, photography, printmaking, sculpture, or combined media.

Studio courses occupy approximately one-half of the student's time during the four years at Cornell; the remaining time is devoted to a diversified program of academic subjects with a generous provision for electives.

All members of the faculty in the Department of Art are practicing, exhibiting artists, whose work represents a broad range of expression.

A candidate for the B.F.A. degree may also earn a bachelor of arts degree from the College of Arts and Sciences or the College of Human Ecology, or a bachelor of science degree from the College of Engineering, in a five-year dual degree program. This decision should be made early in the candidate's career (no later than the third semester) so that he or she can apply to be registered in both colleges simultaneously. Each student is assigned an advisor in both colleges of their dual-degree program to provide needed guidance. Candidates for two degrees must satisfy all requirements for both degrees. At least 62 of the total credits must come from courses offered in the Department of Art. In addition, all Department of Art requirements for first-year writing seminars, art history, and distribution must be met.

It is expected that a dual-degree candidate will complete the pre-thesis and thesis requirements for the B.F.A. degree during the fourth and fifth year.

Bachelor of Fine Arts Degree Requirements

Credits and Distribution

The B.F.A. degree requires 130 academic credits. A minimum of 59 are taken in the Department of Art.

Curriculum

Students are expected to take an average course load of 16 credits per semester during their four years. Students wishing to take more than three studio courses in any one semester must file a petition. All students must take at least one studio course a semester unless there are exceptional circumstances expressed in the form of a petition. **Any deviation from the standard curriculum must be petitioned to the department before the act. No student in the first year of the B.F.A. program will be permitted to deviate from the required curriculum.**

Specific Course Requirements

By the end of the second year, students must have completed an introductory course in each of the areas of painting, sculpture, printmaking, photography, electronic imaging, and four drawing courses. By the end of the third year, all students must have completed an additional 12 credits beyond the introductory level in three of the four areas.

Concentration

Students must plan their programs to complete 26–27 credits in one of the studio areas of electronic imaging, painting, photography, printmaking, or sculpture. Declaration of the area of concentration must be made by the second semester of the sophomore year. Students concentrating in combined media must also submit an approved projected course plan. B.F.A. students complete a senior thesis in one area of concentration and are required to participate in the Senior Exhibition in the semester the Thesis II is taken.

Concentration Requirements (27 credits total; 26 in printmaking)

The required courses for each concentration are as follows:

Electronic Imaging: ART 1701; 2304/2702 (1 of 2); 2703; 3703/3704 (1 of 2), 4001, 4002 (senior thesis)

Painting: ART 1201, 2201, 3201, 3202, 4001, 4002 (senior thesis)

Photography: ART 1601, 2601, 2603; 2604, 2605, 3601 (1 of 3); 4001, 4002 (senior thesis)

Printmaking: ART 1301/1302/1303/1304 (2 of 4); 2301/2302/2303/2304 (1 of 4); 3301, 4001, 4002 (senior thesis)

Sculpture: ART 1401, 2401, 3401, 3402, 4001, 4002 (senior thesis)

Dual Concentration

Students interested in studying in more than one area may choose to do a dual concentration. The dual concentration requires a first area, in which the thesis is conducted, and a nonthesis second area. Thesis I and Thesis II must be taken in the first area of concentration. Students take 23 credits in the first area of concentration (22 for printmaking) and 15 credits in the second area of concentration (14 for printmaking). Drawing is available only as a second area of concentration.

The required courses for the dual concentration are:

First Area of Concentration Total Credits

Electronic Imaging: ART 1701, 2304/2702 (1 of 2); 2703/3703/3704 (1 of 3), 4001/4002 23

Painting: ART 1201, 2201, 3201, 4001, 4002 23

Photography: ART 1601, 2601, 2603/2604/2605/3601 (1 of 4), 4001, 4002 23

Printmaking: ART 1301/1302/1303 (2 of 3), 2301/2302/2303/2304 (1 of 4), 4001, 4002 22

Sculpture: ART 1401, 2401, 3401, 4001, 4002 23

Second Area of Concentration Total Credits

Drawing: ART 1501, 1502, 2501, 2502, independent study 15

Electronic Imaging: ART 1701, 2304/2702 (1 of 2), 2703, 3703/3704 (1 of 2) 15

Painting: ART 1201, 2201, 3201, 3202 15

Photography: ART 1601, 2601, 2603/2604/2605/3601 (2 of 4) 15

Printmaking: ART 1301/1302/1303 (2 of 3), 2301/2302/2303 (1 of 3), 3301 14

Sculpture: ART 1401, 2401, 3401, 3402 15

Note: The total number of out-of-college elective credits required will be adjusted to allow for the additional credits required of the dual concentration.

Combined Media Concentration

The combined media concentration enables students to fulfill concentration requirements by combining several studio disciplines, including out-of-department studio courses such as those offered in the departments of music and theatre, film, and dance.

Students must file an approved "area of concentration" form. In addition to the courses required of all B.F.A. majors during their first and second year (see B.F.A. curriculum), students must take two studios at the 2000 or 3000 level, a minimum of two "out of college" studio electives (OCE studio) of 3–4 credits each, ART 4001 Thesis I and ART 4002 Thesis II.

Note: The total number of in- and out-of-college elective credits required will be adjusted to allow for additional credits required of the combined media concentration.

Cornell in Rome

The studio art component of the Cornell in Rome program draws upon the historical and cultural resources of Rome, its museums, art, and architecture, and its beauty and complexity. It provides an experience unparalleled for artistic, intellectual, and personal growth.

The program provides close individual instruction and studios that are structured but flexible enough to accommodate personal interests. Students are given the freedom to generate their own ideas and may work in any medium that compels them to investigate their personal relationship to Rome. Student projects include paintings, photo essays, collages, performance installation, sculptures, drawings, and books.

Artists resident in Rome visit and lecture. Day trips to the studios of Rome-based artists and artisans provide further inspiration. Workshops on papermaking, fresco, mosaics, egg tempera, and watercolor are frequently available.

Visitors from the various academies in Rome give student artists contact with their contemporaries and with those representing international art movements. An extensive and varied field-trip program balances great historic collections with modern and contemporary art, and the best of Italy's notable cities, towns, and landscapes.

The Rome Studio (ART 4000) may be taken for course credit in all Department of Art concentrations, and additional studio courses expose students to a wide variety of art-making modes. Each Cornell art student receives the equivalent of one semester's advanced study in his or her concentration.

The inspiration of travel and cultural encounter fuels the studio experience, and many students keep sketchbooks and journals, which they will refer to in the art they make after their return from Rome.

Art Requirements

Students in good academic standing who have completed the requirements of the first two years of a fine arts program are eligible for participation in Cornell in Rome. Students are admitted to the program by application and review of their record. Students must register for a full semester of credits.

Students may enroll in the first or second semester of their junior year or for the full academic year. Under special circumstances, first-semester seniors also may attend Cornell in Rome. Serious studio art students from outside Cornell also are encouraged to apply. A portfolio is required.

Sample Rome Curriculum

ART 4000	Rome Studio Requirement for Rome B.F.A. students, fulfills 4 credits in a studio concentration	4
ART 2009	Site-Specific Processes	3
ART 3102*	Modern Art in Italy	3
ART 3107	History of Art in Rome: Early Christian to the Baroque Age	4
or		
ART 3108	History of Art in Rome: Renaissance in Rome and Florence	4
or		
ART 3702	Special Topics in Art History (Spring only)	4
or		
ART 3702	Special Topics: Intermediate and Advanced Drawing	3
ITALA		
1110/1120	Italian Language	4
[ARCH 3107	Contemporary Italian Film 1**]	

**Students may add by approved petition to take 19 credits in Rome.

17–18 Total

Other electives available to B.F.A. students include courses in architectural history, visual studies, and urban studies.

Students may petition to take more than 16 credits per semester in the Rome Program. Students may study in Rome for one or two academic semesters.

*Fulfills 3000-level theory and criticism requirement.

AAP NYC

AAP NYC is a dynamic site from which to explore contemporary art and visual culture and to create art that is responsive to urban issues and life. The Department of Art offers distinctive programs for B.F.A. students from Cornell and other colleges and universities during a January Winter Session and spring semester.

New York is a vast and diverse laboratory with extraordinary museums and galleries, countless studios of artists and designers, dynamic public art, and cultural sites and organizations that offer exceptional opportunities for students to learn first-hand about the production and presentation of art. Scheduled annually, the spring semester is a

collaboratively developed and conceptually linked plan of study with studio and theory courses, independent studies, and internships that all use the remarkable resources and opportunities of the city. Faculty members include practicing artists, theorists, critics, and curators.

The spring semester is planned for art majors in their sophomore year, but students at other levels may participate. The Winter Session is open to all students who seek an intensive, thematically organized immersion in contemporary art theory and practice. In addition to the department's Rome junior-year semester, all undergraduate art majors are encouraged to participate in at least one of these unique New York-based opportunities.

Sample AAP NYC Curriculum

The focus of these courses may vary from year to year.

- ART 2000 New York City Studio
- ART 2001 New York City Seminar
- ART 2003 Art/Architecture History in NYC
- ART 2004 Drawing Projects (Studio)
- ART 2019 Independent Study/Studio in NYC
- ART 2109 Art Practicum in NYC (Field Studies)

Out-of-College Requirements

A minimum of 61 elective credits must be taken outside of the college. In the first year, students must take two first-year writing seminars. Students are required to take courses from among three groups, which include physical and biological sciences (minimum of two courses, of at least 3 credits each); social sciences (minimum of three courses, of at least 3 credits each); and humanities and expressive arts (minimum of three courses, of at least 3 credits each). All B.F.A. students are required to take 20 credits in the history of art. One course must be taken in each of the following areas:

Modern

BFA students can satisfy the modern art history requirement with any of these courses without petition.

- ARTH 2600 Intro to Art History: The Modern Era
- ARTH 2700 Mapping America
- ARTH 3170 Visual Culture
- ARTH 3550 Modern and Contemporary Latin American Art
- ARTH 3600 Intro to Art History: Contemporary Art: 1960 to Present
- ARTH 3605 U.S. Art from FDR to Reagan
- ARTH 3650 History and Theory of Digital Art
- ARTH 3660 Conceptual Art
- ARTH 3740 Painting 19th-Century America
- ARTH 3760 Impressionism in Society
- ARTH 4047 Aesthetic Theory: The End of Art
- ARTH 4505 Contemporary African Diaspora Art
- ARTH 4508 Exhibiting Cultures: Museums, Monuments, Rep, and Display

- ARTH 4525 Rastafari Race and Resistance
- ARTH 4578 African Cinema
- ARTH 4600 Studies in Modern Art
- ARTH 4861 Modern Chinese Art
- ARTH 4917 Modern Art and Popular Culture

Non-Western

BFA students can satisfy the non-Western art history requirement with any of these courses without petition.

- ARTH 2350 Introduction to Art History: Islamic Art and Culture
- ARTH 2880 Introduction to Art History: Approach to Asian Art
- ARTH 3510 Introduction to African Art
- ARTH 3550 Modern and Contemporary Latin American Art
- ARTH 3611 Art of South Asia, 1500–Present
- ARTH 3800 Introduction to Arts of China
- ARTH 3805 Representation and Meaning of Chinese Painting
- ARTH 3820 Introduction to Arts of Japan
- ARTH 3850 The Arts of Southeast Asia
- ARTH 3855 The House and the World: Architecture of Asia
- ARTH 4311 The Multicultural Alhambra
- ARTH 4505 Contemporary African Diaspora Art
- ARTH 4578 African Cinema
- ARTH 4850 Art and Collecting: East and West
- ARTH 5571 African Aesthetics
- ARTH 5850 Dancing the Stone
- Three electives: any art history elective at the 3000 level or above or any architectural history elective. Also, the following 2000-level art history courses have been approved to count toward the art history elective requirement:
- ARTH 2019 Thinking Surrealisms
- ARTH 2109 Immigrant Imagination
- ARTH 2200 Introduction to Art History: the Classical World
- ARTH 2247 Art and Archaeology/Ancient Medieval World
- ARTH 2300 Monuments of Medieval Art
- ARTH 2400 Introduction to Art History: Renaissance and Baroque Art
- Note:** Offerings may vary each semester. Students are encouraged to consult the History of Art Department. In addition, students may petition to substitute courses of similar content.

The university requirement of two semesters in physical education must be met.

A candidate for the B.F.A. degree at Cornell is required to spend the last two semesters of candidacy in residence at the university, subject to the conditions of the Cornell faculty legislation of November 14, 1962. No student may study in absentia for more than two semesters.

Students who transfer into the undergraduate degree program in art must complete a minimum of four semesters in residence at Cornell and a minimum of 60 credits at the

university, of which 30 credits must be taken in the Department of Art, including four semesters of studio work.

For those students matriculating in fall of 2009:

Students are required to take ART 1103 Introductory Art Seminar; ART 1201 Introductory Painting; ART 1401 Introductory Sculpture; ART 1501 Drawing I; Art History elective; and a first-year writing seminar during the fall semester of the freshman year. ART 1301/1302/1303 Introductory Printmaking; ART 1502 Drawing II; Art History elective; and an additional first-year writing seminar must be taken during the spring semester of the freshman year. Two 3000-level courses in theory and criticism must be taken sometime between the sophomore and senior years.

Courses that will fulfill the theory and criticism requirement (Note: Offerings may vary from year to year. Check the current course catalog.):

- ART 1700 Visual Imaging in the Electronic Age
- ART 3101 Issues in Contemporary Art
- ART 3102 Modern Art in Italy: Contemporary Issues (Rome Program only)
- ARTH 3170 Visual Culture and Social Theory
- ARTH 3500 African American Art
- ARTH 3660 Conceptual Art
- ARTH 4322 The Late Medieval Devotional Image in Iberia
- ARTH 4600 Studies in Modern Art
- ARTH 4610 Women Artists
- ARTH 4663 Studies in Modern Art (IV)
- ARTH 5571 African Aesthetics
- ARTH 5993–5994: Supervised Reading
- ANTHR 3202 Arts of the Roman Empire
- ANTHR 3420 Myth, Ritual, and Symbol
- ARCH 4407 Architectural Design and the Utopian Tradition
- ASRC 3500 African American Art
- ASRC 6506 African Aesthetics
- ENGL 2000 Introduction of Criticism and Theory
- ENGL 3905 Video: Art, Theory, and Politics
- FGSS 4040 Women Artists
- FILM 3760 History and Theory
- GERST 6600 Visual Ideology
- GOVT 3755 Visual Culture and Social Theory

First Year

<i>Fall Semester (Required Curriculum)</i>	<i>Credits</i>
1103 Introductory Art Seminar	3
Art History Elective	4
1201 Introductory Painting	3
1401 Introductory Sculpture	3
1501 Drawing I	3
First-year writing seminar	3
	<hr/> 19

Spring Semester (Required Curriculum)

Art History Elective	4
1502 Drawing II	3
One of the following:	3
1301 Introductory Intaglio	
1302 Introductory Graphics	
1303 Introductory Lithography	
First-year writing seminar	3
In/out-of-college elective	3
	<hr/> 16

Second Year

Fall Semester (Required Curriculum) Credits

1601 Introductory Photography	3
1701 Electronic Imaging in Art	3
2501 Drawing III	3
Out-of-college elective (OCE)/Art History	3-4
OCE	3
	<hr/> 15-16

Spring Semester

2000-level studio	4
2000-level studio	4
In/OCE	3
3000-level course in theory and criticism	3
OCE	3
	<hr/> 17

Third Year

Fall Semester

2000-level studio	4
Art studio concentration	4
Art history elective or 3000-level course in theory and criticism	3-4
OCE	3
In/OCE	3
	<hr/> 17-18

Spring Semester

Art studio concentration	4
Art history elective or 3000-level course in theory and criticism	3-4
In/OCE (two courses)	7
	<hr/> 14-15

Fourth Year

Fall Semester

Thesis I	6
2502 Advanced Drawing Workshop	3
In/OCE (two to three courses)	7
	<hr/> 16

Spring Semester

Thesis II	6
In/OCE (three courses)	9
	<hr/> 15

The M.F.A. Program

The master of fine arts program requires four semesters of full-time study, equal to a minimum of 60 credits. Graduate work done elsewhere or in the summer session is not applicable to the M.F.A. degree. The curriculum leading to the master's degree is flexible to accommodate the needs of the individual student and to enable the student to partake of the greater Cornell community. The ratio of graduate faculty to students allows an exceptional opportunity for individual mentoring. Graduate students are provided individual studios and have 24-hour access to studios and labs.

Graduate students in art may enroll in introductory or advanced courses in any field of study offered at the university. Fifteen credits are required in each semester; of these, 9 credits are in studio work, and 3 credits are in graduate seminar. Students are required to take at least 12 credits of academic work outside the Department of Art during their four semesters in residence. Candidates for the master of fine arts degree must have completed 18 credits in the history of art in the course of their graduate and/or undergraduate study. Prior undergraduate art history course work may apply toward this requirement and will be evaluated by the director of graduate studies. Any remaining credit toward this requirement must be taken at Cornell. Every M.F.A. candidate must prepare a written statement, offer a thesis exhibition of studio work completed during residency, and give an oral defense of the written statement and visual thesis. Gallery space is provided for a one-week solo thesis exhibition during the final spring semester.

Course Information

Most courses in the Department of Art are open to students in any college of the university who have fulfilled the prerequisites or have permission of the instructor. Priority is given to B.F.A. majors and AAP students.

Fees are charged for all studio courses. See the specific course description for course fees.

To take advantage of the special opportunities afforded by summer study, several courses are offered during summer session.

Guidelines for Independent Study

A student who wishes to undertake an independent study must be a junior and in good academic standing. Fine arts students must have completed two years of the curriculum, **including all first- and second-year studios and four semesters of drawing.** Students must have prior approval to have an independent study count as a drawing requirement. All students must have taken a minimum of one Cornell art department course in the area of the proposed independent study. It is recommended that the student take the independent study with a professor with whom they have previously studied. Out-of-department students may be exempt from the studio sequence requirement at the discretion of the supervising professor. Independent studies must be petitioned to count toward required studio courses. Credit hours are variable up to a maximum of 4.

Courses in Theory and Criticism

ART 1103 Introductory Art Seminar

Fall. 3 credits. Prerequisite: B.F.A. students. Letter grades only. Staff. This course links theory and practice through a study of issues of contemporary art with a first-semester drawing course. The course is an opportunity for new B.F.A. students to explore issues and questions of contemporary art and culture that have particular relevance for students and artists in the early 21st century. The objectives of the course are to help B.F.A. students develop a keener understanding of issues in contemporary art; create an open forum and exploratory studio environment; and introduce first semester/first year Art majors to the intellectual community and aesthetic environment of a university art department and Cornell at large.

Through a series of coordinated activities, readings, projects, and discussions, first-year/first-semester B.F.A. students jointly and dynamically explore ideas of vision, visuality, perception, representation, and contemporary visual culture through both studio-based drawing projects, readings in art history and contemporary art criticism and theory, and close examination of selected artists' practices. Taught by a faculty member in cooperation with Drawing I faculty members, the course seeks to make meaningful connections between practice and theory in students' thinking and creative work and serves as a cohesive first-year experience shared by all new Art majors.

ART 1701 Visual Imaging in the Electronic Age

Fall or spring. 3 credits. D. Greenberg. Interdisciplinary survey course designed to introduce students in the creative arts, science, and engineering to the concepts of digital pictorial representation and display. It is a concept and theory course that concentrates on "why" rather than "how." Topics include perspective representations, display technology, how television works, bandwidth concepts, digital photography, computer graphics modeling and rendering, matting and compositing, color perception, data acquisition, volumetric imaging, and historical precedents, primarily from the art world. Also included are other modes of imaging.

ART 2001 New York City Seminar

Spring. 4 credits. Staff. This seminar involves readings, discussion, writing, trips to museums and galleries, artists, studios, other field trips, and presentations by leading critics and scholars who present and examine issues of contemporary art in one of the leading art centers of the world. The seminar is developed to conceptually connect to the studio and art/architecture history course in which students are enrolled. This course fulfills a Theory and Criticism course for B.F.A. majors.

[ART 2104 Art and the Multicultural Experience

Fall. 3 credits. R. Dalton. Investigates selected topics related to art and the multicultural experience. Students study the basic vocabulary and tools used in the expression of art. Students question the nature of the visual arts as a discipline and survey art created by underrepresented American minority cultural groups.]

ART 3101 Issues in Contemporary Art

Fall or spring. Lab fee: \$35. Staff.
Students will be exposed to the ideas, issues, and methods of contemporary visual art by combining studio practice with discussions of critical and theoretical concerns in visual culture. The course combines lectures, readings, discussions, project work, and critiques. Students will make art by using a variety of mediums, with projects structured in relation to issues and artists covered in the lecture component. Discussions of historical movements and artists since the 1980s will be stressed. Studio assignments are designed to familiarize students with a number of ways of making art and in encouraging the understanding of the connections between the conceptual and the technical in art making.

ART 3102 Modern Art in Italy

Fall or spring. 3 credits. Fulfills 3000-level theory and criticism requirement for fine arts majors. Prerequisite: Rome Program participants. Staff.
Introduces students to contemporary art in Rome through studio visits, gallery exhibitions, and museum collections. Lectures by artists, critics, and others. Traces art from idea to realization and explores the gallery and its relationship to artists and to promotion of art, the role of the art critic and museum, and art collecting.

Related Courses**ART 2003 Art/Arch History in NYC**

Spring. 3 credits. Staff.
This course uses New York as a site to study developments in modern and contemporary art, architecture, and design. With students in architecture and other fields, art students study in a seminar format the historical connections of art and architectural innovations in the context of one of the world's most complex and vibrant urban environments. The course includes reading, lectures, and presentations, as well as field trips and walking tours. This course fulfills a 3000-level art history elective requirement for BFA majors.

ART 3107 History of Art in Rome: Early Christian to the Baroque Age

4 credits. Rome Program. Not offered every year. Staff.
General survey of the early Christian period to the fantastic vision of Piranesi in the 18th century. Special emphasis will be placed on the developments of the Renaissance and Baroque periods. Weekly lecture and field trips.

ART 3108 History of Art in Rome: Renaissance in Rome and Florence

Not offered every year. Staff.
Surveys art from the beginning of the 15th century to Michelangelo's death (1564) with field trips to important churches, collections, and villas. Emphasis is given to sculpture and painting, and in the case of fresco, mosaics, and stucco decoration, the relationship with architecture and environment is a key element.

ART 4109 Independent Study/Supervised Readings in Art

Fall, spring, or summer. 4 credits, variable. Prerequisite: juniors in good academic standing and written permission of instructor. Staff.
Independent reading and research allows a student the opportunity to investigate special

interests that are not treated in regularly scheduled courses. The student develops a plan of study to pursue under the supervision of a faculty member.

Graduate Studio and Theory Courses**ART 6101 Professional Skills for the Visual Artist**

Spring. 3 credits. Prerequisite: M.F.A. students. Staff.
This seminar helps fine arts graduate students build professional skills that will assist them in their careers as practicing artists and in their work at art-related employment. Students complete a resource notebook that will be useful to them in the years after they graduate. Topics include funding resources, exhibition opportunities, employment options, documentation of work, health, safety, and legal issues.

ART 6102 Recent Practice in the Visual Arts

Fall. 3 credits. Prerequisite: M.F.A. students. Staff.
This seminar is designed to provide graduate students with an overview of recent visual artwork. Students study work from a wide range of artists who have received significant recognition within the visual arts community. Reviews of major exhibitions such as "Documenta," "La Biennale di Venezia," and the "Whitney Biennial" are discussed. Students are encouraged to travel to nearby cities to look at contemporary work.

ART 6103 Online Publication for the Visual Artist

Fall. 3 credits. Prerequisite: M.F.A. students. Staff.
Seminar designed to introduce graduate students to the basic principles of electronic imaging. As a major project, each student interviews a contemporary visual artist. These interviews are illustrated with digital images of each artist's work and combined in an online magazine. Additionally each student learns to create a home page on the web.

ART 6104 Contemporary Theory in the Visual Arts

Spring. 3 credits. Prerequisite: M.F.A. students. Staff.
Seminar exploring selected writings on the current issues represented within the visual arts. Designed to introduce graduate students to several approaches to critical inquiry and analysis of contemporary visual practice. Topics vary but may include related criticism in areas such as visual culture, semiotics, identity politics, and institutional frames.

ART 6203 Contemporary Theory and Visual Culture

Fall. 3 credits. Prerequisite: M.F.A. students. Staff.
Seminar exploring selected writings on current issues in the visual arts. Designed to introduce graduate students to several approaches to critical inquiry and analysis of contemporary practice in the visual arts. Topics vary but may include related criticism in areas such as visual culture, semiotics, identity politics, and institutional frames.

ART 6204 Current Criticism in the Visual Arts

Spring. 3 credits. Prerequisite: M.F.A. students. Staff.
Seminar designed to introduce graduate students to critical writing in the visual arts,

both in print and in digital format. As a major project, each student interviews a contemporary visual artist. These interviews are illustrated with digital images of each artist's work and combined in an online magazine. Additionally, each student learns to create a home page on the web.

Graduate Studio Courses**ART 7001-7002 Graduate Studio I and II**

7001, fall; 7002 spring. 9 credits.
Prerequisite: first-year M.F.A. students. Staff.

Required for all M.F.A. students. Course instructor is the chair of student's Special Committee. Students are responsible, under faculty direction, for planning their own projects and selecting the media in which they work. All members of the faculty are available for individual consultation.

ART 8001-8002 Graduate Studio III and IV

8001, fall; 8002, spring. 9 credits. Second-year M.F.A. students. Staff.
Required for all MFA students. Course instructor is the chair of student's Special Committee. Students are responsible, under faculty direction, for planning their own projects and selecting the media in which they work. All members of the faculty are available for individual consultation.

Undergraduate Studio Courses in Drawing

Fees for all drawing courses: \$25

ART 1500 Summer Drawing I

Summer, three-week session. 3 credits.
Course does not fulfill studio credit for ART 1501 Drawing I requirement. Staff.
General course introduces students to principles and techniques of representation. Emphasis is on creating the illusion of space and form through line, the rendering of light and shade, and studies in perspective. Students have the opportunity to explore various media such as charcoal, chalk, pencil, pen, ink, and wash.

ART 1501 Drawing I

Fall, spring. 3 credits. Preference given to B.F.A. students. Staff.
General course introducing students to principles and techniques of representation. Emphasis is on creating the illusion of space and form through line, the rendering of light and shade, and studies in perspective. Students have the opportunity to explore various media such as charcoal, chalk, pencil, pen, ink, and wash.

ART 1502 Drawing II

Spring. 3 credits. Prerequisite: ART 1501. Preference given to B.F.A. students. Staff.
General course in drawing that emphasizes figure study and life drawing. Builds on the foundation of ART 1501 and concentrates on the analytical study of the figure. Students explore a variety of materials, traditional and contemporary.

ART 1503 Summer Drawing II

Summer, three-week session. Course does not fulfill studio credit for ART 1502 Drawing II requirement. Staff.
General course in drawing that emphasizes figure study and life drawing. Builds on the foundation of ART 1500 and concentrates on the analytical study of the figure. Students

explore a variety of materials, traditional and contemporary.

ART 1507 Observation and Conception: Drawing

Summer, six-week session. 3 credits. Staff. Experimental investigations related to various properties of drawing relevant to contemporary artistic practices. Working from the imagination as well as studies from life serve as the basic structure for this course. These practices range from pictorial representation to conceptual strategies. The team-taught aspect of this course allows for a critical discourse and an intensive approach to learning skills and developing sensibilities, building a foundation for all further advanced visual media studies.

ART 1508 Conceptual Drawing

Summer, six-week session. 3 credits. Staff. Emphasizes drawing from the imagination. Stresses the generation of ideas and their development in sketches. The intent is not to produce finished art but rather to experience a series of problems that require image and design concepts different from those of the artist working directly from nature.

ART 1509 Life and Still-Life Drawing

Summer, six-week session. 3 credits. Staff. Studies the human figure and still life both as isolated phenomena and in relation to their environment. Focuses on helping the student observe and discover.

ART 2004 Drawing Projects (Studio)

Spring. 3 credits. Prerequisite: ART 1502, Drawing II. This course fulfills ART 2501 Drawing III for B.F.A. majors. Staff.

In this course, drawing is explored in its multiple forms and capacities to explore, experience, and represent ideas of the city—its physical forms and diverse neighborhoods and inhabitants. Drawing is developed as a connective tool, navigational device, and research strategy that considers the dynamic conditions of the urban context through the independent vision of artists. Students pursue both experimental and more developed individual, serial, and collaborative drawing projects using a generous range of materials and formats. The boundaries and conventions of drawing are challenged and questioned.

ART 2501 Drawing III

Fall. 3 credits. Prerequisite: ART 1502.

Preference given to B.F.A. students. Staff. Intermediate drawing course in which students study composition, the articulation of form, and the illusion of space in a variety of materials. Expressive content, conceptualization, and the exploration of materials are stressed.

ART 2502 Advanced Drawing Workshop

Fall or spring. 3 credits. Prerequisite: ART 2501. Corequisite: B.F.A. Thesis I studio. Staff.

This advanced studio workshop focuses on the use of drawing for the development and refinement of complex visual expression. Using both traditional and nontraditional drawing approaches, students work to clarify their conceptual concerns and develop a pertinent visual vocabulary. This course begins with assignments structured to identify the conceptual and formal considerations central to each student's individual artistic intentions. Once identified, these artistic intentions become the basis for a rigorous investigation. The resulting body of work informs and supports advanced thesis work across the

visual art and design disciplines. This course includes faculty and student presentations on historical and contemporary art, as well as regular critiques focusing on peer evaluation.

ART 4509 Independent Studio in Drawing

Fall, spring, or summer. 4 credits, variable. Prerequisites: juniors in good academic standing and written permission of instructor. Staff.

Independent studio in drawing that allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide his or her progress and evaluate the results.

Undergraduate Studio Courses in Electronic Imaging

Course fees:

1701, 3702, 4709	\$250
2304, 2701, 2702	\$105
3703/3704	\$250
4001, 4002	\$ 70

ART 1701 Electronic Imaging in Art

Fall or spring. 3 credits. Preference given to B.F.A. students. Staff.

This is an introductory studio course using the computer for contemporary art making. Students approach software programs by researching historical and contemporary art issues, with emphasis on the constructed image, motion, virtuality, and interactivity.

ART 2304 Large-Format Digital Printing

Fall and spring. 4 credits. Prerequisite: ART 1701. Preference given to B.F.A. students. Staff.

Focuses on the use of digital printing and its use in combination with traditional forms of printmaking. Students explore various approaches to image making while also using traditional materials and media, including relief, monotype, lithography, screen printing, intaglio, transfers, collage, and photomechanical processes. Students use appropriate software, including Adobe Photoshop, QuarkXPress, Final Cut Pro, and Adobe Illustrator to draw from both still and video-based sources. Students work with large-format inkjet printers.

ART 2702 Digital Video and Sound

Fall or spring. 4 credits. Prerequisite: ART 1701. Preference given to B.F.A. students. Not offered every year. Staff.

Studio course that introduces students to digital video including capture stills, animation, video, and sound with an introduction to interactive presentation and CD-ROM production. This course concentrates on the web.

ART 2703 Computer Animation (also CIS 5640)

Fall. 4 credits. Preference given to B.F.A. students. D. Greenberg.

Focuses on techniques of computer animations. Combines critical readings with studio projects that employ a variety of animation software. Topics include modeling, storyboarding, 2-D and 3-D key frame animation, motion and kinematics, lighting effect and shading, texturing and material properties, physical simulation, and cinematography.

ART 3703 Advanced Projects in Time-Based Art

Fall. 4 credits. Prerequisites: ART 1701 and one of the following: ART 2304, 2702, 2703, or permission of instructor.

Preference given to B.F.A. students. Letter grades only. Staff.

This course teaches advanced techniques for creating nonlinear moving images with digital sound. Projects include integrating key frame-based animation, layering animated text, still, and video images made with 3D software applications, field recording, and sound mixing. Emphasis will be placed on ways of integrating and manipulating time-based images and sound to make multimedia art projects and installations for public spaces.

ART 3704 Interactive Digital Media

Spring. 4 credits. Prerequisites: ART 1701 and one of the following: ART 2304, 2702, 2703, or permission of instructor. Letter grades only. Staff.

This is a project-centered studio course designed to encourage students to integrate computer-aided and time-based media (video, sound, motion graphics, and text) using physical materials and space. The course will challenge students to develop a theoretical understanding of the relationship between body and technology in a social and cultural context. Students will use digital technologies to create projects using interactive CD-ROM/web art, sensor and micro-controller aided interactive video and sound installations, real-time performance, and public space. The course encourages integrative approaches to studio production.

ART 4001 Thesis I

Fall and spring. 6 credits. Prerequisites: ART 1701, 2304 or 2702; 2703; 3703 or 3704. Staff.

This course prepares students for the final semester of thesis when they fully develop and complete a final exhibition/project of a new distinctive body of work. During Thesis I, students begin to research, develop, clarify, and sharpen and deepen their thesis proposal through dialogues, critiques, reading, and other activities with members of a Core Thesis Faculty. Thesis I encourages independent, critical thinking and requires students to reflect on their work to date—and their work in the future—with an understanding of historical, theoretical, and conceptual contexts.

ART 4002 Thesis II

Fall and spring. 6 credits. Prerequisite: ART 4001. Staff.

This course is the final semester when B.F.A. students continue to develop, refine, and produce their final capstone work, which may take the form of an exhibition or some other project. Thesis II involves the creation of new work in consultation with Core Thesis Faculty members and other faculty advisors.

Undergraduate Studio Courses in Painting

Fees for painting courses (1201, 2201, 3201, 3202, 4001, 4002, 4209): \$40

ART 1201 Introductory Painting

Fall, spring, or summer. 3 credits.

Preference given to B.F.A. students. Staff.

Studies the language of painting through color, form, materials, and techniques. Aspects of traditional and modern pictorial composition are studied including proportion, space, and color theory through the representation of a variety of subjects.

ART 2201 Painting II

Fall or spring. 4 credits. Prerequisite: ART 1201 or permission of instructor.

Preference given to B.F.A. students. Staff. Continuation of the study of aspects of pictorial composition initiated in ART 1201, focusing on problems relating to the depiction of the figure, space, and light. Topics are explored within the context of historical and contemporary artistic expression.

ART 3201 Painting III

Fall or spring. 4 credits. Prerequisite: ART 2201 or permission of instructor. Staff.

Intensive study of painting materials and techniques to express pictorial ideas. A variety of traditional painting techniques are explored including egg tempera, fresco, gouache, encaustic, and oil. In addition, paints and associated techniques developed in the 20th century are used as well as developing technologies applicable to the painting process.

ART 3202 Painting IV

Fall or spring. 4 credits. Prerequisite: ART 3201 or permission of instructor. Staff.

Advanced course centered on issues of artistic expression. A variety of painting media are used to address conceptual issues through representation as well as abstraction.

ART 4001 Thesis I

Fall or spring. 6 credits. Prerequisite: ART 3202. Staff.

This course prepares students for the final semester of thesis when they fully develop and complete a final exhibition/project of a new distinctive body of work. During Thesis I, students begin to research, develop, clarify, and sharpen and deepen their thesis proposal through dialogues, critiques, reading, and other activities with members of a Core Thesis Faculty. Thesis I encourages independent, critical thinking and requires students to reflect on their work to date—and their work in the future—with an understanding of historical, theoretical, and conceptual contexts.

ART 4002 Thesis II

Fall or spring. 6 credits. Prerequisite: ART 4001. Staff.

This course is the final semester when B.F.A. students continue to develop, refine, and produce their final capstone work, which may take the form of an exhibition or some other project. Thesis II involves the creation of new work in consultation with Core Thesis Faculty members and other faculty advisors.

ART 4209 Independent Studio in Painting

Fall, spring, or summer. 4 credits, variable. Prerequisites: juniors in good academic standing and permission of instructor. Staff.

Independent studio in painting that allows students the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide his or her progress and evaluate results.

Undergraduate Studio Courses in Photography

Darkroom fees for photography courses:

Black-and-white courses: \$135

Color courses: \$215

Additional black-and-white course taken the same semester: \$55

Additional color course taken the same semester: \$135

ART 1601 Photography I

Fall, spring, or summer. 3 credits. Preference given to B.F.A. students. Course fee: \$135. Staff.

Basic lecture-studio course in black-and-white photography for beginners. Emphasis is on basic camera skills, darkroom techniques, and understanding of photographic imagery.

ART 1608 Black-and-White Photography

Summer, three-week session only. 3 credits. Course fee: \$135. Preference given to B.F.A. students. Staff.

Intended for students at all levels, from introductory to advanced. Emphasis is on camera skills, darkroom techniques, and the content of black-and-white photographic imagery.

ART 1609 Color Photography

Summer, three-week session only. 3 credits. Preference given to B.F.A. students. Course fee: \$215. Staff.

Intended for students at all levels, from introductory to advanced. Emphasis is on camera skills, darkroom techniques, and the content of color photographic imagery.

ART 2601 Photography II

Fall, spring, or summer. 4 credits. Prerequisite: ART 1601 or ARCH 2501, or permission of instructor. Preference given to B.F.A. students. Course fee: \$135. Staff. Continuation of Photography I, concentrating on black-and-white photographic processes, history and theory of creative practice, and individual projects.

ART 2603 Color Photography

Fall and summer. 4 credits. Prerequisite: ART 1601 or ARCH 2501, or permission of instructor. Preference given to B.F.A. students. Course fee: \$215. Staff.

Studio course in color photography with emphasis on camera skills, darkroom techniques, and the content of color photography.

ART 2604 Photo Processes

Fall, spring, or summer. 4 credits. Prerequisite: ART 1601 or ARCH 2501, or permission of instructor. Preference given to B.F.A. students. Staff.

Studio course in alternative and nonsilver photographic processes. Emphasis is on camera skills, basic techniques and processes, image content, and creative use of photo processes.

ART 3601 Photography III

Fall, spring, or summer. 4 credits. Prerequisite: ART 1601, 2601, or permission of instructor. Preference given to B.F.A. students. Staff.

Continued study of creative use of photography, with emphasis on specialized individual projects.

ART 3605 Studio Photography

Fall or spring. 4 credits. Prerequisite: ART 1601 or ARCH 2501, and ART 2601 or 2603, or permission of instructor.

Preference given to B.F.A. students. Staff. Course in the use of medium- and large-format cameras that explores technique, lighting, and the use of larger-format cameras for personal expression both in the studio and outdoors.

ART 4001 Thesis I

Fall or spring. 6 credits. Prerequisite: ART 2601, 2603. Course fee will depend on what process the student is using. Staff.

This course prepares students for the final semester of thesis when they fully develop and complete a final exhibition/project of a new distinctive body of work. During Thesis I, students begin to research, develop, clarify, and sharpen and deepen their thesis proposal through dialogues, critiques, reading, and other activities with members of a Core Thesis Faculty. Thesis I encourages independent, critical thinking and requires students to reflect on their work to date—and their work in the future—with an understanding of historical, theoretical, and conceptual contexts.

ART 4002 Thesis II

Fall or spring. 6 credits. Prerequisite: ART 4001. Course fee will depend on what process the student is using. Staff.

This course is the final semester when B.F.A. students continue to develop, refine, and produce their final capstone work, which may take the form of an exhibition or some other project. Thesis II involves the creation of new work in consultation with Core Thesis Faculty members and other faculty advisors.

ART 4609 Independent Studio in Photography

Fall, spring, or summer. 4 credits, variable. Prerequisites: juniors in good academic standing and written permission of instructor. Course fee will depend on what process the student is using. Staff.

Independent studio in photography that allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide his or her progress and evaluate the results.

Undergraduate Studio Courses in Printmaking

Fees for printmaking courses:

Intaglio (1301, 2301, 4001, 4002, 4309): \$95

Screenprinting (1302, 2302, 4001, 4002, 4309): \$45

Lithography (1303, 2303, 4001, 4002, 4309): \$95

Expanded Print Forms (1304, 2304): \$95

ART 1301 Introductory Intaglio

Fall and spring. 3 credits. Preference given to B.F.A. students. Staff.

Basic introduction to etching techniques, with emphasis on engraving, lift ground, relief printing, monotypes, and experimental techniques.

ART 1302 Introductory Graphics

Fall and spring. 3 credits. Preference given to B.F.A. students. Staff.

Introduces the two-dimensional thought process and the language of vision. Students

explore design projects and the use of graphic materials, including collage, pochoir, and screen printing.

ART 1303 Introductory Lithography

Fall and spring. 3 credits. Preference given to B.F.A. students. Staff.

Study of the theory and practice of lithographic printing, using limestone block and aluminum plate. Basic lithographic techniques of crayon, wash, and transfer drawing are studied.

ART 1304 Expanded Print Forms

Spring. 3 credits. Prerequisite: one of the following: ART 1301, 1302, 1303, 1601, 1701, 2501, or permission of instructor.

Preference given to B.F.A. students. Staff. Intensive experimental studio designed to introduce students to various ideas and processes of making artists' books. Encourages the integration of studio practice (photography, printmaking, drawing, and painting) with new digital strategies (digital photography/ink jet print, video/sound, CD-ROM/digital book making). Presents both concept and process as related to the visual book form. An introduction to digital publication as an expanded print form helps students investigate how the book is reinvented or reshaped within an electronic context.

ART 2301 Intaglio II

Spring. 4 credits. Prerequisite: ART 1301. Preference given to B.F.A. students. Staff.

Studio course in advanced etching techniques. Refinement of processes and ideas through the uses of aquatint, spit bite, lift ground, soft ground, and dry point in black and white with an introduction to multiple-plate color printmaking.

[ART 2302 Advanced Screen Printing]

ART 2303 Lithography II

Spring. 4 credits. Prerequisite: ART 1303. Preference given to B.F.A. students. Staff.

Theory and practice of lithographic printing using lithographic stones and aluminum plates. Traditional techniques in crayon, tusche wash, and color printing as well as photolithography using kodalith and computer-generated transparencies.

ART 2304 Large-Format Digital Printing

Fall and spring. 4 credits. Prerequisites: ART 1601, 1701, and one of the following: ART 1301, 1302, 1303, 1304 or permission of instructor. Preference given to B.F.A. students. Staff.

Focuses on the use of digital printing and its use in combination with traditional forms of printmaking. Students explore various approaches to image making while also using traditional materials and media, including relief, monotype, lithography, screen printing, intaglio, transfers, collage, and photo-mechanical processes. Students use appropriate software, including Adobe PhotoShop, QuarkXPress, Final Cut Pro, and Adobe Illustrator to draw from both still and video base sources. Students work with large-format inkjet printers.

ART 3301 Printmaking III

Fall or spring. 4 credits. Prerequisite: ART 2301, 2302, or 2303 or permission of instructor. Staff.

Study of the art of graphics through both assigned and independent projects. Work may concentrate in any one of the graphic media or in a combination of media.

ART 3302 Printmaking IV

Fall. 4 credits. Prerequisite: ART 3301 or permission of instructor. Staff. Continuation and expansion of ART 3301.

ART 4001 Thesis I

Fall or spring. 6 credits. Prerequisite: ART 3302. Staff.

This course prepares students for the final semester of thesis when they fully develop and complete a final exhibition/project of a new distinctive body of work. During Thesis I, students begin to research, develop, clarify, and sharpen and deepen their thesis proposal through dialogues, critiques, reading, and other activities with members of a Core Thesis Faculty. Thesis I encourages independent, critical thinking and requires students to reflect on their work to date—and their work in the future—with an understanding of historical, theoretical, and conceptual contexts.

ART 4002 Thesis II

Fall or spring. 6 credits. Prerequisite: ART 4001. Staff.

This course is the final semester when B.F.A. students continue to develop, refine, and produce their final capstone work, which may take the form of an exhibition or some other project. Thesis II involves the creation of new work in consultation with Core Thesis Faculty members and other faculty advisors.

ART 4309 Independent Studio in Printmaking

Fall, spring, or summer. 4 credits, variable. Prerequisites: juniors in good academic standing and written permission of instructor. Staff.

Independent studio in printmaking that allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide his or her progress and evaluate the results.

Undergraduate Studio Courses in Sculpture

Fees for sculpture courses:

1401:	\$50
2401, 3401, 3402, 3403, 4001, 4002, 4009:	\$75

ART 1401 Introductory Sculpture

Fall, spring, or summer. 3 credits. Preference given to B.F.A. students. Staff.

Series of studio problems introducing the student to the basic principles of artistic expression in three-dimensions, i.e., clay modeling, direct plaster, plaster casting, and construction in wood, metal, and other materials.

ART 2401 Sculpture II

Fall or spring. 4 credits. Prerequisite: ART 1401, or architecture design studio, or permission of instructor. Preference given to B.F.A. students. Staff.

Various materials, including clay, plaster, wood, stone, and metal, are used for exercises involving figurative modeling, abstract carving, and other aspects of three-dimensional form and design. Beginning in the second year, students are encouraged to explore bronze/metal casting processes. The sculpture program, which is housed in its own building, contains a fully equipped bronze-casting foundry.

ART 3401 Sculpture III

Fall or spring. 4 credits. Prerequisite: ART 2401 or permission of instructor. Staff. Continued study of the principles of sculpture and conceptual development. Each student explores the selection and expressive use of materials, media, scale, and content. Group discussions and individual criticism. Experimentation is encouraged.

ART 3402 Sculpture IV

Fall or spring. 4 credits. Prerequisite: ART 3401 or permission of instructor. Staff. Continuation and expansion of ART 3401. Special projects may include site-specific and/or large-scale installations.

ART 3403 Sculpture V

Fall or spring. 4 credits. Prerequisite: ART 3402 or permission of instructor. Staff. Continued study of the principles of sculpture and the selection and expressive use of materials and media. Group discussions and individual criticism.

ART 4001 Thesis I

Fall or spring. 6 credits. Prerequisite: ART 3402. Staff.

This course prepares students for the final semester of thesis when they fully develop and complete a final exhibition/project of a new distinctive body of work. During Thesis I, students begin to research, develop, clarify, and sharpen and deepen their thesis proposal through dialogues, critiques, reading, and other activities with members of a Core Thesis Faculty. Thesis I encourages independent, critical thinking and requires students to reflect on their work to date—and their work in the future—with an understanding of historical, theoretical, and conceptual contexts.

ART 4002 Thesis II

Fall or spring. 6 credits. Prerequisite: ART 4001. Staff.

This course is the final semester when B.F.A. students continue to develop, refine, and produce their final capstone work which may take the form of an exhibition or some other project. Thesis II involves the creation of new work in consultation with Core Thesis Faculty members and other faculty advisors.

ART 4409 Independent Studio in Sculpture

Fall, spring, or summer. 4 credits variable. Prerequisites: juniors in good academic standing and written permission of instructor. Staff.

Independent studio in sculpture that allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide his or her progress and evaluate the results.

Special Studio Courses

ART 1109 Internship Practicum

Fall, spring, and summer. Variable credit. S–U grades only.

Students serving as interns with art-related businesses or institutions may receive 1 academic credit upon receipt of a letter from the internship sponsor confirming successful performance of internship responsibilities. Students may earn up to 3 hours of nongraded credit for internships and these credits may not be used to fulfill or waive department of art academic and studio requirements.

ART 1505 Drawing Rome

Summer. 3 credits. Letter grades only.
Staff.

The course introduces students to methods of representing space and form through a study and application of perspective and the effects of light and shade. Uses of line, tone, and color will be investigated. The subject is the city of Rome: its public spaces, churches, museums, archaeological zones, and the residents and visitors who occupy it. A variety of materials are used including pencil, ink, charcoal, pastel and collage. With the exception of one or two in-studio sessions, all work will be done onsite in Rome. Course meets four weeks, five times per week.

ART 2000 New York City Studio

Spring. 4 credits. This course fulfills a 2000-level studio for BFA majors. Staff. This interdisciplinary course is thematically and topically organized. Through a series of research-based assignments and independent and collaborative arts projects, students actively engage the city as a site of open investigation and critical engagement. The thematically based studio encourages and allows students to work with a range of media. Students are encouraged to participate not as painters, printmakers, or sculptors, but as artists who pursue and use a range of materials and methodologies as part of a creative process. Students work in the AAP NYC space, as well as other sites in New York City.

ART 2019 Independent Study/Studio in NYC

Spring. 2-4 credits, variable. Staff. In consultation with a faculty member, students may pursue a thoughtfully developed and rigorous independent study that utilizes the context and content of New York to create an innovative research project, performance, intervention, installation, or other body of work. Student must complete an ART Independent Study/Studio form.

ART 2109 Art Practicum in NYC

Spring. 1-6 credits, variable. This course fulfills an IN/OUT college elective for B.F.A. majors. The credit amount will be determined by and in consultation with the department chair. Students choose an internship with an arts, cultural, or civic organization that has an established relationship with AAP NYC or another organization or venue. Students have direct, hands-on experience and receive academic credit for their work.

ART 3702 Special Topics in Art Studio

Fall, spring, or summer. 4 credits, variable. Staff. Exploration of a particular theme or project. For example, Special Topics in Art History, offered spring 2009 for Rome Program participants.

ART 3709 Independent Studio in Rome

Fall and spring. 4 credits, variable. Prerequisites: Rome Program participants; juniors in good academic standing and written permission of instructor. Staff. Independent studio in Rome that allows non-art majors the opportunity to pursue special interests in fine arts not treated in regularly scheduled courses. The student plans a course of study or projects that meet the approval of the faculty member selected to guide his or her progress and evaluate the results.

ART 3809 Independent Study/Cornell in NYC

Fall, winter, spring, or summer. 4 credits variable. Prerequisite: student in good academic standing and written permission of instructor on an approved independent study form. Staff. Independent study or studio allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide his or her progress and evaluate the results.

ART 4000 Rome Studio

Fall or spring. 4 credits. Fulfills 4 credits of concentration requirement. Prerequisites: Rome Program participants; permission of instructor. Content for Rome studio determined by instructor. Lab fee: \$60; additional fees for photography and printmaking. Staff. Emphasis is divided between work accomplished in the studio and work executed outdoors in the environs of Rome. Media consist primarily of painting, drawing, sculpture, and photography, or those assigned by the instructor.

ART 4709 Independent Studio in Electronic Imaging

Fall, spring, or summer. 4 credits, variable. Prerequisites: juniors in good academic standing and written permission of instructor. Staff. Independent studio in electronic imaging that allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide his or her progress and evaluate the results.

ART 4809 Independent Studio in Combined Media

Fall, spring, or summer. 4 credits, variable. Prerequisites: juniors in good academic standing and written permission of instructor. Lab fee: \$70. Staff. An independent studio in combined media that allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide his or her progress and evaluate the results.

CITY AND REGIONAL PLANNING

K. Donaghy, chair (106 W. Sibley Hall, 254-5378); S. Baugher, L. Benería, R. S. Booth, director, URS program; N. Brooks, S. Christopherson, J. Chusid, P. Clavel, M. Drennan, J. F. Forester, A. Forsyth, W. W. Goldsmith, R. Kiely, director, Urban Scholars Program, N. Kudva, C. Lai, D. Lewis, B. Lynch, P. Olpadwala, R. Pendall, K. Reardon, S. Saltzman, M. A. Tomlan, M. Warner. Emeriti: S. Czamanski, W. Isard, J. W. Repts, S. Schmidt, S. W. Stein, R. T. Trancik. Visiting: I. Azis, T. Vietorisz

The department offers several programs of study at both the undergraduate and graduate levels.

The Undergraduate Program in Urban and Regional Studies

The program in Urban and Regional Studies (URS) is a four-year academic program aimed at assessing the problems of human communities and regions. Graduates from the program receive a Bachelor of Science degree. The program provides both an excellent liberal arts education and a strong concentration of studies addressing urban and regional issues. Courses in the program provide students with a broad understanding of urban issues, the ability to assess those issues, and skills technical analysis. The URS program is truly interdisciplinary: students learn to evaluate urban and regional problems by using wide ranges of analytic tools and disciplinary perspectives.

URS Statement of Purpose

The URS program encompasses an interdisciplinary, liberal arts course of study focused on the forces that shape the social, economic, and political character and physical form of cities, suburbs, and their surrounding regions. Students pursue knowledge in a range of disciplines, acquire significant writing skills, quantitative and non-quantitative analytical skills, and develop the capacity to think broadly and deeply regarding the past, present, and future of urbanized communities and their inhabitants.

Like many quality liberal arts programs, the URS program requires students to develop a broad academic base in the physical and biological sciences, quantitative methods and mathematics, social sciences and history, humanities and the arts, and writing. The major requires students to complete a series of four introductory courses and encourages them to develop expertise in looking at cities, suburbs, and metropolitan regions through a series of lenses. Students use theory to examine social dynamics, politics, economics, history, design and land use patterns, and environmental problems.

Graduates pursue a wide variety of advanced studies and careers in city and regional planning, historic preservation, real estate, architecture, landscape architecture, public administration and law; and positions in the public sector: teaching, not-for-profit institutions, and consulting firms.

Advanced Placement Credit

Students may apply up to two courses of approved advanced placement credit in calculus, computer science, and science toward satisfaction of the distribution requirement in Groups 1 and 2 previously established by the College of Arts and Sciences or in the groups Physical and Biological Sciences (PBS) and Mathematics and Quantitative Reasoning (MQR) currently used by the College of Arts and Sciences, provided that they must complete at least one science course during their undergraduate career. They may apply no advanced placement credit toward the distribution requirements in categories currently established by the College of Arts and Sciences in Cultural Analysis (CA); Historical Analysis (HA); Knowledge, Cognition, and Moral Reasoning (KCM); Literature and the Arts (LA); and Social and Behavioral Analysis (SBA).

Basic Degree Requirements for Students in the Graduating Classes of 2011 and Subsequent Years

URS requirements for graduation include (a) eight semesters of residence; (b) 120 credits; (c) General Education Requirements consisting of writing seminars, qualification in one foreign language, and a series of distribution requirements; (d) required courses for the major; (e) area requirements for the major; (f) free electives; (g) a minimum of 34 courses; and (h) completion of the university physical education requirement. Note: Physical education credit does not count toward graduation or toward the 12-credit minimum required for good academic standing each semester. No course may satisfy more than one requirement.

More specifically these requirements include

1. General Education

- First-year writing seminars*: two courses. Students earning a score of 5 on both English literature and English language exams will receive 3 credits (in out-of-college electives) and place out of one first-year writing seminar.
- Foreign language*: qualification in one foreign language can be demonstrated by completing three courses in one foreign language in high school, **or** by taking the Cornell Advanced Standing Examination (CASE), **or** by successfully completing two to three college-level foreign language courses.
- Distribution Requirements*: nine courses. Students must successfully complete nine courses for the distribution requirement. A total of four courses must be completed in the categories of Physical and Biological Sciences (PBS-AS) and Mathematics and Quantitative Reasoning (MQR-AS). Of those four courses, **at least two** must be classified as PBS **and at least one** course must be classified as MQR course. The fourth course can be classified as either PBS or MQR. The remaining five courses must be courses identified by the College of Arts and Sciences in the categories of Cultural Analysis (CA-AS), Historical Analysis (HA-AS), Knowledge, Cognition, and Moral Reasoning (KCM-AS), Literature and the Arts (LA), and Social and Behavior Analysis (SBA). These five courses must be selected from at least four of these five categories (i.e., CA-AS, HA-AS, KCM-AS, LA-AS, and SBA-AS). No more than three of these five courses can be taken in any one department. URS students may petition to substitute equivalent courses from the Colleges of Agriculture and Life Sciences, Engineering, Human Ecology, Industrial and Labor Relations, and Architecture, Art, and Planning. Grades of S–U cannot be applied toward the distribution requirement.

URS students may not apply college credit earned before entering Cornell as a freshman to satisfy any distribution course requirement. However, they may petition to have that credit counted toward the 120 total credits required for graduation.

2. Required Courses for the Major: seven courses

CRP 1100 The American City (fall, 3 credits)

CRP 1101 The Global City: People, Production, and Planning in the Third World (spring, 3 credits)

CRP 1106 URS First-Year Seminar (fall, 1 credit)

CRP 2000 The Promise and Pitfalls of Contemporary Planning (fall, 3 credits)

CRP 2010 People, Planning and Politics in the City (spring, 3 credits)

Microeconomics: one course from a list of microeconomics courses (fall or spring, 3 or 4 credits)

Statistics: one course from a list of statistics courses (fall or spring, 3 or 4 credits)

3. Area Requirements: six CRP courses

The program requires that students take courses in six areas:

- Design and Land Use (one course from designated list of courses)
Students understand cities, suburbs, and regions in terms of aesthetic perspectives (both historically and in the present) and patterns of human use of land that shape physical, social, ecological, and economic character.
- Urban History, Society, and Politics (one course from designated list of courses)
Students examine the growth, development, and character of today's urbanized areas and their resident populations, in light of a complicated and constantly evolving interplay of historical forces, social and economic concerns, and political constituencies, ideas, and choices.
- Environment (one course from designated list of courses)
Students become aware of the past, present, and future influence of the natural environment (including both living and nonliving elements) as modified by humans, in shaping, and in many instances substantially limiting the growth and development of cities/suburbs and regions.
- Regional Development and Globalization (one course from designated list of courses)
Students learn to recognize how the economic health and general well-being of particular cities/suburbs and regions, and their inhabitants, is dramatically influenced by far-flung social and economic forces whose impacts are felt throughout whole regions, nations, and even the world at large.
- Methods for Planning and Urban Studies (one course in qualitative/field methods from designated list of courses).
Students gain knowledge and skills regarding use of interview, survey, participant observation, and other nonquantitative methods in analyzing attitudes, behaviors, trends, and other information pertinent to the growth and development of cities/suburbs and regions, and the well-being of their inhabitants.

- Methods for Planning and Urban Studies (one course in quantitative methods from designated lists of courses).
Students understand, develop, and apply tools used in analyzing economic, sociological, and other quantitative data relevant to the development, implementation, and assessment of public and private actions that influence the growth and development of cities/suburbs and regions, and the well-being of their inhabitants.

Basic Degree Requirements for Students in the Graduating Class of 2010

Students in the class of 2010 should refer to the distribution requirements specified in *Courses of Study* for the year in which they matriculated.

Honors Program

Each year a few well-qualified seniors may join the honors program at the beginning of their senior year. Each honors student develops and writes an honors thesis under the guidance of his or her faculty advisor.

Urban Studies Minor (non-URS majors)

The Urban and Regional Studies minor has been formulated specifically for those students not enrolled in the Program of Urban and Regional Studies who are interested in complementing their current academic program with an introduction to various facets of urban studies (domestic, environmental, international, professional, urban affairs).

To complete the Urban and Regional Studies (URS) minor, students must take at least six courses (minimum total of 18 credits) in the Department of City and Regional Planning (CRP). Courses must be completed with letter grade of C or above, as follows:

1. Nine (9) credits of required core courses:

CRP 1100 The American City (3 credits)

CRP 1101 The Global City: People, Production, and Planning in the Third World (3 credits)

CRP 2000 The Promise and Pitfalls of Contemporary Planning (3 credits)

2. Nine (9) credits of elective department courses at the 3000 level or higher.

(Please consult department course listings.)

Students meet with their home college faculty advisor. Upon completion of course requirements, students complete a URS minor application form, available in 106 W. Sibley Hall. The URS program director (who also serves as URS minor advisor) verifies completion of the minor, signs the form, and sends a letter (on department letterhead) to the student's home college. The home college will record completion of the URS minor on the student's transcript.

URS Students in Minors Offered by Other Departments

The department recognizes minors earned within the university (accepting standards set by various colleges). URS students may apply for minors in any college (e.g., Africana Studies, Architecture, Latino Studies, Southeast Asian Studies, and Feminist,

Gender, and Sexuality Studies). When a student satisfies the requirements for a minor, and formal notification is received by the AAP registrar, the concentration will be recorded on the student's official transcript at the time of graduation.

Off-Campus Opportunities

Cornell in Rome. The urban studies component of Cornell in Rome is offered during the spring semester for students interested in the economic, political, cultural, and social life of contemporary European cities and regions. It is open to urban studies majors and related disciplines.

By living and studying in the center of one of the world's most historic, beautiful, and dynamic cities, students gain a deeper understanding of the powerful local, regional, and global forces that are reshaping urban communities abroad and at home.

In addition to taking classes with architecture and art students, participants engage in field research and assist civic leaders and municipal officials in developing workable solutions to challenging problems confronting contemporary Roman neighborhoods.

Students meet with professional planners, government officials, community activists, leading architects, researchers, and others responsible for urban policy-making in the areas of economic development, neighborhood stabilization, urban design, regional planning, city management, agricultural development, tourism, historic preservation, and immigration.

Students complement their classes and fieldwork with travel to Italy's most important artistic, economic, and political centers. Participants have the opportunity to see Italy and its European neighbors work together to form a more powerful regional economy and political alliance through the increasingly influential European Union.

The program's cultural immersion and community-based research experience significantly strengthen application for graduate or professional school, and also enhance the effectiveness of young professionals employed in increasingly global workplaces.

Graduate planning and international studies students gain invaluable work experience as full-time interns with one of the United Nations agencies headquartered in Rome (such as the Food and Agricultural Organization or the International Commission on Objects and Monuments), in an Italian city planning agency (fluent Italian required), or in a nongovernmental agency. Rome faculty members help graduate students individually to arrange intern positions. An updated résumé and internship questionnaire must be submitted with the program application.

AAP NYC. AAP NYC provides an exciting off-campus semester with courses and professors that engages students with New York City's economics and politics, housing and transportation, and art and design. Participants study the use of streets and public spaces, and faculty and guest lecturers guide students through the astonishing variety of the world's premier city.

Studying and living in New York City complements classroom-based coursework in Ithaca with the chance to learn onsite. The

New York program is envisioned to fit well with both Ithaca and Rome allowing students to apply ideas first encountered in Ithaca courses to the big-city laboratories off campus. The CRP faculty has identified a diverse set of educational partners, connected to both the public and private sectors, to provide high-quality site visits, guidance in professional internships, and special events.

During a semester in New York City, Urban and Regional Studies (URS) juniors and seniors can learn how such a complex system functions, how its elements interact, how new businesses set up and prosper while others fail, and how City Hall, the Port Authority, and various other state and local agencies try to manage things.

The internship course combines work experience two days each week with formal Friday lunchtime discussions. Every other Friday experienced professionals from across the metropolitan region join students to discuss their current work in planning, design, and development. On alternate Fridays students report on their work, meeting with faculty and fellow interns.

Students enjoy opportunities to gain work experience on issues ranging from arts and culture to planning, public policy, housing, and economic development through CRP's internship program. Students may select work with private firms, public agencies, neighborhood-based groups, or NGOs. The list of possible internships is extensive and individually tailored. Interns take full advantage of the special resources of New York, working with people in AAP's broad network of alumni and friends in a range of professional fields. Placements are matched to students' study areas and career interests. *Students with the appropriate academic background from other colleges at Cornell or outside Cornell may be eligible to attend.*

Cornell in Washington Program (CiW). Students in good standing may earn degree credits through course work and an externship in Washington, D.C. Students at CiW may work as externs with congressional offices, executive-branch agencies, interest groups, research institutions, and other organizations involved in politics and public policy. Students take an 8-credit research course and select one or two seminars from such fields as government, history, economics, human development, architectural history, natural resources, and social policy. Cornell faculty members teach these seminars, which provide credit toward fulfillment of major, distribution, and other academic requirements.

Cornell Abroad. Qualified undergraduates are encouraged to study abroad because exposure to foreign cultures can be an eye-opening aspect of a university education. In an increasingly interdependent world, the experience of living and learning in a foreign country is invaluable. Study-abroad opportunities are continually being developed, and programs are available in many countries. The department encourages URS students to explore these opportunities.

Research and fieldwork. Students are welcome to work with department faculty members on research or other opportunities that are appropriate to their particular interests. Fieldwork and community-service

options also exist for students in the Urban and Regional Studies Program.

Additional Degree Options

Linked degree options. URS students may earn both a bachelor of science degree and a master of regional planning (M.R.P.) degree in a fifth year of study. Ordinarily the professional M.R.P. degree requires two years of work beyond that for the bachelor's degree. Under this option, a minimum of 30 credits and a master's thesis or thesis project are required for the M.R.P. degree. Interested students apply to the Graduate School, usually in the senior year.

Dual-degree options. A student accepted in Cornell's College of Arts and Sciences may earn both a B.A. in a College of Arts and Sciences major and a B.S. in Urban and Regional Studies in a total of five years. A student accepted in Cornell's College of Agriculture and Life Sciences (CALs) may earn both a B.S. in Landscape Architecture and a B.S. in URS in a total of five years. Special requirements have been established for these dual-degree programs. Cornell students interested in pursuing the dual-degree program should contact either the director of the Urban and Regional Studies Program or the appropriate dean of the College of Arts and Sciences or of CALs for further information.

Admissions Requirements and Procedures

Among the most important criteria for admission to the Urban and Regional Studies Program are intellectual potential and commitment—a combination of ability, achievement, motivation, diligence, and use of educational and social opportunities. Nonacademic qualifications are important as well. The department encourages students with outstanding personal qualities, initiative, and leadership ability. Above all, the department seeks students with a high level of enthusiasm and depth of interest in the study of urban and regional issues. Applicants must complete a university admission application. Although an interview is not required, applicants are urged to visit the campus if that is possible. Applicants who want further information regarding the Urban and Regional Studies Program may contact Professor Richard Booth, program director, Urban and Regional Studies, Cornell University, 106 West Sibley Hall, Ithaca, NY 14853-6701, 607-255-4025).

Transfer Students

In most cases, transfer applicants should no longer be affiliated with a high school and should have completed no fewer than 12 credits of college or university work at the time of application. High school students who have completed graduation requirements at midyear and are taking college courses for the rest of the academic year should apply as freshmen. Prospective candidates who believe that their circumstances are exceptional should consult with the director of admissions in the Cornell division of interest to them before filing an application.

Forms for transfer application and financial aid are available from the Cornell University Office of Admissions, 410 Thurston Avenue, Ithaca, NY 14850-2488. Official transcripts of all high school and college work must be

submitted along with SAT or ACT scores and letters of recommendation.

Prospective transfer students should have taken at least 6 credits in English. In addition, students should have taken basic college-level courses distributed across the natural and social sciences, humanities, and mathematics. Applicants whose previous course work closely parallels the "General Education" requirements of the Urban and Regional Studies curriculum will have relative ease in transferring. Nevertheless, students with other academic backgrounds, such as engineering, architecture, fine arts, management, and agriculture, are eligible to apply.

Although an interview is not required, applicants are urged to visit the campus if that is possible. Applicants who want further information regarding the Urban and Regional Studies Program may contact Professor Richard Booth, program director, Urban and Regional Studies, Cornell University, 106 West Sibley Hall, Ithaca, NY 14853-6701, 607-255-4025.

The Graduate Program in City and Regional Planning

There are five graduate degree programs in the city and regional planning department. The master of regional planning program (M.R.P.) stresses skills basic to professional planning practice and responds to individual needs and interests. The faculty strongly recommends that students concentrate in one of three areas of planning. The Land Use and Environmental Planning concentration focuses on the forces and actions that directly affect the physical character, transformation, rehabilitation, and preservation of cities and regions. Economic Development Planning: Communities and Regions focuses on the economies of neighborhoods, cities, and regions with the intent of producing more informed and effective economic development policy. International Studies in Planning (ISP) focuses on urban, regional, and international development processes and their implications for people's lives and livelihoods in diverse international contexts.

The master of professional studies in international development (M.P.S./I.D.) degree is administered jointly with the Cornell International Institute for Food, Agriculture, and Development (CIIFAD). It is intended to meet the specific training needs of experienced planners or midcareer professionals in related fields.

The 60-credit master of arts (M.A.) in historic preservation planning prepares students for professional work in the creative preservation and use of our physical heritage.

The master of science (M.S.) or master of arts (M.A.) degree in regional science is the study of regional economies and their interactions with each other. Central issues include capital flows, trade, location of economic activity, growth, and regional conflicts. Graduates are positioned for careers as researchers and policy analysts at the highest levels in national governments, corporations, and international organizations.

The doctor of philosophy (Ph.D.) program is for those who seek advanced, specialized education for a career in teaching, research, or policy making.

Off-Campus Opportunities

Cornell in Rome. Graduate students have the opportunity to spend one or two semesters in Rome, studying at Cornell's center at the Palazzo Lazzaroni. Instruction is given by Cornell professors-in-residence and by other faculty. The program is structured to include work assignments in one of the international development organizations headquartered in Rome.

Course Information

Most courses in the Department of City and Regional Planning are open to students in any college of the university who have fulfilled the prerequisites and have the permission of the instructor.

The department attempts to offer courses according to the information that follows. However, students should check with the department at the beginning of each semester for late changes.

Undergraduate Program in Urban and Regional Studies

CRP 1100 The American City

Fall. 3 credits. S-U or letter grades for out-of-department students only. Staff. Introductory course on the evolution of urban problems and opportunities facing the majority of this country's population as we enter the first decade of the 21st century. Readings, discussions, and brief papers explore topics ranging from suburban development to central city poverty, from environmental threats to downtown revitalization, and from municipal finance to the new position of women in the urban economy.

CRP 1101 The Global City

Spring. 3 credits. S-U or letter grades for out-of-department students only. A. Forsyth. Critical look at the physical and social development of giant cities in the Third World. Their origins, roles, contributions, and shortcomings are examined. Their place in world political economy is evaluated. Policy prescriptions for their principal problems are discussed.

CRP 1106 URS First-Year Seminar

Fall. 1 credit. S-U grades only. R. Booth. Introduces students to substantive issues of the diverse disciplines that make up the planning profession through weekly interaction with CRP and other faculty members in the department. Students have the opportunity to engage in open discussions.

CRP 2000 The Promise and Pitfalls of Contemporary Planning

Fall. 3 credits. Prerequisite: CRP 1100. A. Sanchez. Introduction to the historical origins and evolution of the city planning profession in the United States. The theoretical foundation, core values, primary methods, and key challenges facing contemporary planners are examined through a combination of readings, lectures, films, guest speakers, and field trips. Students acquire a deeper understanding of professional practice by working with local officials to develop community development profiles for several Ithaca neighborhoods.

CRP 2010 People, Planning, and Politics in the City

Spring. 3 credits. Prerequisites: CRP 1100 and 1101. P. Olpadwala. Seminar examining various bases of political and professional power. What do professionals who want to serve the public need to know about power and decision-making processes in the institutional settings in which they operate? How and why can professionals make a difference when facing problems characterized by great complexity and severe inequalities among affected groups? The course addresses these and others questions.

CRP 2300 Community Service Fieldwork

Fall or spring. 4 credits, variable. Prerequisite: permission of instructor. Staff. Undergraduate students work under the direction of a faculty member in the CRP department on a project that assists a public or nonprofit organization. Projects involve urban and regional issues as defined by a client and agreed upon by the faculty member.

CRP 3010 Public Administration (also CRP 6010)

Fall. 3 credits. Not offered every year. R. Schwarting. This course prepares students to work within government departments and agencies, state and local authorities, and nonprofit public benefit corporations; and with private firms working in the public interest at the interface with governments and public benefit corporations. While the emphasis is on local and mid-size organizations, some material will address international and domestic national level organizations. As a first-year graduate program course it prepares students to conduct research on public organizations leadership and management and to be effective in public careers. It also prepares upper-level undergraduate students for internships and entry into public-sector careers.

CRP 3011 Ethics, Development, and Globalization (also CRP 6011)

Fall or spring. 4 credits. K. Donaghy. This seminar surveys some of the most important recent contributions to the literatures of development ethics and global ethics and examines their power to illuminate such issues as the nature of development, poverty and human rights, globalization and local autonomy, environmentalism and consumerism, and humanitarian intervention and just wars.

CRP 3072 Land Use, Environmental Planning, and Urban Design Workshop (also CRP 5072)

Fall or spring. 4 credits. A. Forsyth. Land Use and Environmental Planning workshop courses focus on the forces and actions that directly affect the physical character, transformation, rehabilitation, and preservation of natural landscapes, cities, and regions. Topics of study include, among others, development of land use and natural conservation plans, design and implementation of "smart growth" policies, evaluation of infrastructure requirements, strategies for making cities more environmentally sustainable, design and analysis of public spaces, and strategies for increasing housing opportunities.

CRP 3090 Community Development Seminar (also CRP 5090)

Spring. 3 credits. Letter grades.
K. Reardon.

Introduction to the theory, method, and practice of contemporary community development. Topics include the role community-based organizations are playing in promoting sustainable development in distressed communities; the contribution planners are making to enhancing the organizational capacity of community-based organizations; and the interplay between neighborhood-based community development activities and regional economic development policy-making.

CRP 3101 Race, Space, Place (also AAS/AMST 3950/6950, CRP 6101)

Fall or spring. 3 credits. C. Lai.

This seminar examines critical theories of race and space and investigates key sites where racial formation and spatial production intersect. These multiscalar sites include the neoliberal city, the prison industrial complex, and the Mississippi Delta. We analyze not only the fatal coupling of difference, power, and space, but also the spatial politics of resistance and refusal.

CRP 3102 Asian American Politics and Public Policy (also AAS 3900, AMST 3102/6102, CRP 6102)

Fall or spring. 3 credits. C. Lai.

United States political institutions have shaped Asian American immigration, community formation, and political expression. They have also influenced legal rights and racial formation processes. This course examines public policy and political issues that affect Asian Pacific Americans, including electoral politics, social justice/grassroots movements, affirmative action, and multiracial/interracial coalitions. We investigate both the interaction between state institutions and political movements and how this dialectic frames political issues and accommodates political challenges. Particular attention will be paid to different means of political organization and different strategies toward political empowerment. The course will be situated within the broader context of post civil-rights racial politics and postwar political economic restructuring.

CRP 3105 Urban Political Economy Seminar: Property and Expropriation (also CRP 6105)

Fall or spring. 3 credits. C. Lai.

This course deals with current topics in urban political economy and examines past and present-day seizure of land, resources, and ways of life as well as resistance against such seizures. We begin with an examination of colonial conquest and the expropriation of the English commons in the 17th and 18th centuries and conclude with contemporary anti-globalization struggles against privatization. Our reading will come from social history, political geography, and ethnic studies.

CRP 3111 Immigrant Entrepreneurship Markets and the U.S. City: The Latino(a) Case (also CRP 6111, LSP 3111/6111)

Spring. 3 credits. A. Sanchez.

The rise in urban entrepreneurship among certain immigrant groups, and the variable forms of neo-liberal economic and spatial restructuring in U.S. cities, require that we view immigrant businesses from a critical and

transdisciplinary perspective. This course will foreground how distinct ethnic entrepreneurial patterns and socially constructed immigrant labor markets are framed by both difference and policy regimes.

CRP 3180 Politics of Community Development (also CRP 5180, LSP 3180/5180)

Spring. 3 credits. Letter grades. Staff.
Seminar on city economic development and community institutions. Attention to issues of local politics, planning, housing, and economics. Term papers on field investigations are encouraged. Topics vary from year to year.

CRP 3201 Qualitative Research and Design Methods (also CRP 6201)

Fall or spring. 3 credits. J. Forester.
This course focuses on theoretical and practical dimensions of qualitative research design and methods. The course covers qualitative designs, ethics including Cornell University's Committee on Human Subjects (UCHS), data-gathering methods including interviews, focus groups, surveys, field observation, and archival research, sampling rationales, data analysis procedures, quality criteria, representation, and reporting.

CRP 3202 Visual Methods in Planning (also CRP 6202)

Spring. 3 credits. Staff.
Visual representation and urban design analysis methods in planning. Topics include design thinking, visual communication of spatial ideas, visual analysis, and graphic techniques in public participation.

CRP 3210 Introduction to Quantitative Methods for the Analysis of Public Policy

Spring. 3 credits. K. Donaghy.
Introduction to the role and use of quantitative methods in the study of urban and regional issues. Focuses on various types of models commonly used to analyze urban and regional policy, including regression models, cost-benefit analysis, simulation, and others. Strengths and weaknesses of those methods are also considered.

CRP 3301 Urban Mentorship Initiative

Fall and spring. 3 credits. Staff.
A service-learning initiative between Cornell and middle/high school students. The course focuses on history, urban education, and social justice in order to prepare students for mentoring of middle/high school students at the school via web-based dialogue and field trips.

CRP 3308 New York City Professional Internships

Fall. 6 credits, variable. Offered in New York City. Staff.
Students will work with program faculty in devising a detailed learning plan that identifies the new knowledge, skills, and capacities they seek to gain through their New York City-based professional internship experience. Students will be placed in public, private, and nonprofit organizations where they will engage in challenging professional activities designed to assist them in acquiring these new competencies. Students will participate in a weekly reflective seminar where they will systematically reflect upon their field-based learning experiences to prepare them to complete a detailed learning portfolio and capstone project through which

they can demonstrate their mastery of the theoretical, conceptual, methodological, and policy content identified in their individualized learning plans. Students will be introduced to key concepts and methods in adult learning, experiential education, field-based research methods, and organizational behavior to empower them to function as both self-directed and reciprocal learners.

CRP 3310 Social Justice and the City: Preparation for Urban Fieldwork

Spring. 3 credits. Prerequisite: Urban Scholar status or permission of instructor. Letter grades only. Staff.

Students are introduced to key sociological, economic, historical, and cultural issues embedded in planning for social justice in urban America. Topics include local realities and micro and macro policies affecting housing, education, immigration, health, legislation, legal affairs, community development, and organizing in a large urban setting. In preparation for field-based learning and research experiences, the challenges of experiential education, public scholarship, and reflective practice will also be addressed both from the perspective of nonprofit organizations and local government agencies serving under-resourced urban communities, and the undergraduate student as learner and worker. Students will be exposed to the principles of participant observation, informal/formal interviewing skills, managing field relations, professional ethics, and ethnographic report-writing.

CRP 3320 Post-Fieldwork Writing Seminar in Urban Policy (also CRP 5220)

Fall. 3 credits. Prerequisite: successful completion of Cornell Urban Scholars, Adult Literacy, or Urban Semester Programs or permission of instructor(s). S-U or letter grades. Staff.

Designed to enhance students' research, writing, analytical, and organizational skills for producing policy-oriented articles that examine vital issues confronting the urban poor. Students will build on prior fieldwork with nonprofit organizations and public agencies.

CRP 3430 Affordable Housing Policy and Programs (also CRP 6430)

Fall. 3 credits. S-U or letter grades.
R. Pendall.

Overview of federal, state, and local policies and programs to deliver affordable housing to low-income people; public housing, vouchers, inclusionary zoning, rent control, and much more. Lectures, debates, short papers, and term paper.

CRP 3502 Suburbia (also CRP 6502)

Fall or spring. 3 credits. A. Forsyth.
Cultural commentators love to hate suburbia but the suburban parts of metropolitan areas are expanding around the globe. Readings, films, and lectures cover topics including suburban history, design planning, ecology, social organization, politics, and culture. Students will use photography, mapping, discussions, and brief papers to develop their own views of suburbia.

CRP 3504 Comparative Urban Development (also CRP 6504)

Fall or spring. 3 credits. S. Schmidt.
This course examines the changing structural and institutional landscape urban planning

and development as practiced in cities and regions in specific areas outside the United States, with a particular focus placed on how these institutional arrangements and conditions compare with the United States

CRP 3506 Environmental Planning Seminar: Wilderness and Wildlands (also CRP 6506)

Fall or spring. 2–3 credits, variable.
E. Thorndike.

This course deals with current topics in environmental planning. Wilderness and wildland resources have been under assault by the Congress, the “Wise Use” movement, property-rights activists, pollutants, and the actual users. This seminar considers historical and philosophical foundations and political factors that affect decisions about environmental policies, planning, acquisition, protection, and management. The roles of government, professional planners and managers, organized special interests, the legal system, citizens, and user groups are examined.

CRP 3508 Urban Transformations in NYC

Fall. 3 credits. Letter grades only. Offered in New York City. Staff.

Students will investigate the structural changes taking place in the New York regional economy and the impact these changes are having on the spatial structure of the city. This background information will be used to identify the major environmental, economic, and social policy issues confronting local civic leaders. Special attention will be given to policy questions that affect economic growth, income and wealth distribution among social groups, environmental sustainability, and citizen participation in policy-making.

CRP 3540 Introduction to Environmental Planning (also CRP 5540)

Fall. 3 credits. S. Schmidt.

Introduction to problems facing planners and decision-makers as they attempt to manage and preserve environmental quality in urban and rural settings. Case studies are used to discuss issues related to sustainability, quality of life, environmental hazards, and environmental justice. Students are also introduced to the basic regulatory and institutional aspects of environmental planning and tools and techniques for environmental impact assessment, inventorying, and risk analysis.

[CRP 3601 Museum and the Public (also CRP 6601)]

Spring. 3 credits. Next offered 2010–2011.
J. Chusid.

Evaluates different types of museums (art, science, history, arboreta, etc.), and their constantly evolving missions in contemporary societies. The material is addressed through site visits, lectures by faculty and guests, readings, case studies and a team semester-long project. Issues covered include the nature of collections; the nature of the audience; the purpose and role of museums; political and cultural questions about collecting, history and interpretation; governance and management; and the core ethical and intellectual values and positions implied or expressed by the institutions. Students will also undertake a comprehensive planning project for a local museum, to be

presented to the client at the end of the semester.]

CRP 3602 American Planning History (also CRP 6602)

Fall. 3 credits. P. Clavel.

This lecture and discussion course covers the 20th-century growth of city and regional planning. Related institutions and individual planners are put in the context of social movements and legislative innovation. Students will also have the opportunity to work with practicing planners, other scholars, and Cornell University Library’s Division of Rare and Manuscript Collections.

CRP 3608 The Built Environment of New York City

Fall. 3 credits. Letter grades only. Offered in New York City. Staff.

Students will learn about the history, culture, politics, and social life of New York City’s newest immigrant communities through an immersion in the contemporary art, poetry, stories, and dance being produced by its most prolific young artists. Weekly visits to the studios, galleries, and performance spaces of these communities will be a central aspect of this experientially based course.

CRP 3610 Seminar in American Urban History (also CRP 6610)

Fall or spring. 3 credits. Prerequisite: permission of instructor. M. Tomlan.

Seminar in the historical evolution of the American city. Emphasizes factors in urban growth, the process of urbanization, the urban reform movement, and intellectual and social responses to the city.

CRP 3650 Gender and Globalization (also FGSS 3600)

Fall. 3 credits. L. Benería.

For description, see FGSS 3600.

CRP 3700 The Regional Question: The Case of Italy

Spring. 4 credits, variable. Prerequisite: Rome Program participants; majors in urban and regional studies. Staff.

The “regional problem” in Italy has long interested regional planners, economists, sociologists, and political scientists. This course makes use of field trips to the Italian Mezzogiorno and the North to explore theoretical and practical aspects of regional inequality. The question of how Italy’s integration into the European Union affects and is affected by its regional issues will be considered.

CRP 3720 20th-Century Italy: Politics and Society

Spring. 3 credits. S–U or letter grades for out-of-department students only. Staff.

Comprehensive survey of Italian society today, starting with Italy’s geography and the historical forces that shaped the nation. Discussion includes north-south tensions and such broad features of Italian social life as community structure, urban development, and family forms. The course also reviews selected institutional issues, such as gender, the system of education, problems of criminality and justice, economic reform, social class, religion, and politics.

CRP 3721 Italy and the European Union (also CRP 6711)

Spring. 4 credits. M. Cremaschi.

The main objective of this course is to develop an advanced understanding of how urban policies are changing in Italy. A great

deal of policy innovation is due to the pressure exerted directly or indirectly by the European Union.

CRP 3760 Latin American Cities (also CRP 6760, LSP 3760/6760)

Fall. 3 credits. A. Sanchez.

This course offers students an opportunity to understand urban dynamics in a rapidly changing region of the world. We ask how colonial powers, the nation-state, and global economic forces have shaped Latin American urban landscapes and the patterns of daily life in the city. The first part of this course explores the social, political, and spatial rural-urban flows, socio-spatial segregation, housing environment and employment. The second half of the course focuses on responses to these social and economic transformations; violence and repression, coping strategies, social movement, and transmigration.

CRP 3801 Asian American Urban Experience (also AAS/AMST 3801/6801, CRP 6801)

Fall or spring. 3 credits. C. Lai.

This seminar uses the case of Asian Americans in the United States to examine the intersection of race, space, and power from a social geographical and ethnic studies framework. The course includes both an introduction to spatial theory and racial theory and history of Asian immigrant communities in the 19th and 20th centuries.

CRP 3810 Principles of Spatial Design and Aesthetics (also CRP 5810)

Fall. 3 credits. Limited to 15 students.

J. Foster.

A lecture projects course that introduces the spatial and visual design vocabularies of cities. Aesthetic principles and theories of design are investigated for different types of urban spaces drawn from a variety of international examples, historic and modern. Included in the course are design methods and applications in the contemporary urban context of Europe and North America.

CRP 3840 Green Cities (also CRP 5840, LA 4950)

Fall. 4 credits. S–U or letter grades. Not offered every year. S. Schmidt.

For the first time in history, a majority of human beings live in cities. As a result, any realistic solution to the global ecological crisis will need to include strategies for urban life that are ecologically sound. This course examines the history and future of urban ecology and the technology and politics that shape it. Alternative transportation, renewable energy, urban design, recycling and resource management, and sustainable economics are explored as means toward transforming cities to become the basis of a new, ecological society. Open to both graduate and undergraduate students. Graduate students have additional research requirements.

CRP 3860 Planning for Sustainable Transportation (also CRP 6860)

Spring. 3 credits. S–U or letter grades. Not offered every year. Staff.

Explores issues related to sustainable transportation policy and practice. The course (1) provides an overview of current transportation trends and their impacts; (2) reviews themes such as planning history and politics, the problems with auto-dominated systems, and key challenges to development sustainable transport systems; and (3) looks

at regulatory, design, and market-based approaches to reducing automobile-dependency, introducing creative sustainable solutions from around the world.

CRP 3900 Professional Planning Colloquium I (also CRP 7850)

Fall. 1 credit. Staff.

Visiting lecturers address problems and opportunities in the practice of planning. Topical focus to be announced. The only formal requirements for the course are attendance and a three- to five-page paper about the lecture series.

CRP 4080 Introduction to Geographic Information Systems (GIS) (also CRP 5080)

Spring. 4 credits. S. Schmidt.

Geographic Information Systems (GIS) have revolutionized the way we manage, analyze, and present spatial information. This course focuses on GIS in the social sciences. Many of the exercises and examples are based on planning issues, but the concepts can be applied to many other disciplines such as government, economics, natural resources, and sociology. Some of the issues covered include fundamentals of spatial analysis; overview of GIS technology and applications; designing a GIS project; gathering and analyzing data; and creating thematic maps.

CRP 4120 Devolution, Privatization, and the New Public Management (also CRP 6120, AEM 4330/6330, FGSS 4110/6110)

Fall. 4 credits. Prerequisite: ECON 1110 or equivalent. S-U or letter grades. Offered every other year. M. Warner.

Addresses devolution and decentralization of government services in a national and international context and then focuses on the local public-sector response in the United States. Privatization, intermunicipal cooperation, and internal restructuring are reviewed, including changing roles for the private sector, nonprofit sector, and unions. Implications for policy, program design, public advocacy, and citizen involvement are addressed. A special topic may include welfare reform. Graduate students are expected to write a major research paper in addition to short papers throughout the semester.

CRP 4160 European City: The Public Sphere and Public Space

Spring. 6 credits, variable. Enrollment may be limited by instructor. Prerequisite: junior or senior standing; Rome Program participants. S-U or letter grades for nonmajors. Staff.

Examination of the social, economic, and political life of the European city, particularly Italian cities, especially Rome. Study of the socioeconomic underpinnings of the city. How are cities organized, and how do citizens relate to the state; the city to the nation; the nation to the global market? How and where do different groups of people live? How do they travel, inside the city and from city to city? How are new parts of the city developed and old ones preserved, transformed, or destroyed? What public services do people expect, and how are they delivered? What is the role of private business? How do Italians/Europeans confront problems of the urban environment, poor neighborhood services, and impoverished immigrants? In all these cases, how do Italian (or European) conditions and policies differ from those in the United States (or elsewhere)?

CRP 4170 Economic Development: Firms, Industries, and Regions (also CRP 5170)

Fall. 4 credits. Not offered every year. S. Christopherson.

Economic development policy in the United States has focused historically on the provision of subsidies to individual firms. As the limitations of this strategy have become more apparent, alternative approaches including multifirm and workforce development are being implemented. This comparative course draws on cases from a variety of industries and national contexts. Particular attention is paid to economic development issues and policies in New York State.

CRP 4440 Resource Management and Environmental Law (also CRP 5440, NTRES 4440)

Spring. 4 credits. Prerequisite: junior, senior, or graduate standing and permission of instructor. R. Booth.

Introduces the application of legal concepts and processes to the management of natural resources and natural-resource areas. Explores the role of the common law, statutory law, administrative regulations, and judicial decisions in managing these resources. Particular focus is given to the management of wildlife, wetlands, and critical resources on public lands, and to the conflicts inherent in government attempts to regulate important natural resources on private lands.

CRP 4590 Legal Aspects of Land Use Planning (also CRP 5590)

Spring. 4 credits. R. Booth.

Survey of leading cases and legal concepts in land-use planning, with particular attention to zoning, subdivision control, condemnation, and growth-control issues.

CRP 4770 Issues in African Development (also CRP 6770)

Fall and spring. 1 credit. S-U grades only. M. Ndulo.

Examines a broad range of critical concerns in contemporary Africa including food production, human resource development, migration, urbanization, environmental resource management, economic growth, and policy guidance. The weekly presentations are made by invited specialists. Students are required to write a term paper.

CRP 4900 Student-Faculty Research

Fall or spring. 4 credits, variable. Prerequisite: undergraduates in Urban and Regional Studies Program. S-U grades only. Staff.

Research, reading, and/or writing project in which a student and faculty member choose a topic related to urban and regional studies.

CRP 4920 Honors Thesis Research

Fall or spring. 4 credits. Prerequisite: Urban and Regional Studies Program majors who have been selected as honor students by department faculty. Staff.

Each selected student works with his or her thesis advisor.

CRP 4930 Honors Thesis Writing

Fall or spring. 4 credits. Prerequisite: CRP 4920. Staff.

Each selected student works with his or her thesis advisor.

CRP 4970 Independent Study

Fall or spring. 4 credits, variable. Prerequisite: junior or senior standing; permission of instructor. Staff.

Special Topics Courses

Fall or spring. Variable credit. Staff.

Typical topics are:

CRP 3850 Special Topics in Planning

CRP 3851 Special Topics in Design and Land Use

CRP 3852 Special Topics in Urban History, Society and Politics

CRP 3853 Special Topics in Environment

CRP 3854 Special Topics in Regional Development and Globalization

CRP 3855 Special Topics in Qualitative and Field Methods

CRP 3856 Special Topics in Quantitative Methods

Graduate Courses and Seminars

Courses numbered from 5000 to 5990 and 6000 to 6990 are generally considered introductory or first-year courses; those numbered from 7000 to 7990 and 8000 to 8990 are generally considered more advanced. Upper-level undergraduate courses are numbered from 3000 to 4990.

(Undergraduate students with the necessary prerequisites and permission of the instructor may enroll in courses numbered 5000 and above.)

CRP 5071 City and Regional Planning Workshop

Fall or spring. 4 credits. Staff.

City and Regional Planning workshop courses focus on planning issues and problems that combine several of the topics undertaken in the various workshop categories. Topics may include public policy issues regarding land use, transportation, public space, municipal services, environmental impact, housing and economic development, and public participation.

CRP 5072 Land Use, Environmental Planning, and Urban Design Workshop

Fall or spring. 4 credits. Staff.

For description, see CRP 3072.

CRP 5073 Historic Preservation Planning Workshop

Fall or spring. 4 credits. Staff.

Historic Preservation Planning workshop courses take students into the field to engage in a range of problems, from conducting a historic resources survey working in a city, town, or village in the region, to developing a scheme for revitalization of an entire neighborhood, to a site-specific economic analysis for the renovation of a surplus school.

CRP 5074 Economic and Community Development Workshop

Fall or spring. 4 credits. Staff.

Economic and Community Development workshop courses focus on the economics of neighborhoods, cities, and regions with the intent of producing more informed and effective economic development policy. Topics of study include, among others, the application of analytical tools needed to produce first-rate economic development

plans, the special needs of excluded, poor and segregated communities, use of quantitative and qualitative methods to address social inequalities, the politics of planning, relationships between economic development and community development.

CRP 5075 Real Estate Workshop

Fall or spring. 4 credits. Staff.
Student are asked to undertake the preparation of reports analyzing various aspects of real estate activity. Individual and team working relationships are required. A range of types of problems that may be encountered in the real estate field are addressed, including project feasibility, marketing, planning and design, legal constraints and concerns, and others. Projects focus on real-world case studies and require professional-level reports suitable for oral and written presentations.

CRP 5076 International Planning and Development Workshop

Fall or spring. 4 credits. Staff.
International Planning and Development courses focus on urban, regional, and international development processes and their implications for people's lives and livelihoods in diverse international contexts. Particular attention is paid to critical assessment of programs that reflect a commitment to environmental sustainability, economic vitality, and social justice.

CRP 5080 Introduction to Geographic Information Systems (GIS) (also CRP 4080)

Spring. 4 credits. S. Schmidt.
For description, see CRP 4080.

CRP 5090 Community Development Seminar (also CRP 3090)

Spring. 3 credits. K. Reardon.
For description, see CRP 3090.

CRP 5120 Public and Spatial Economics for Planners

Spring. 3 credits. No prior knowledge of economics necessary. N. Brooks.
Covers basic microeconomic theory and some topics in macroeconomics. What distinguishes it from foundation courses in economics is that the context of every topic is both spatial and public. The concept of space is central to city and regional planning. The perspective of the public and nonprofit sectors is the same as that of city and regional planning. Both space and the public-nonprofit sectors are peripheral to (or absent from) the usual graduate foundations courses in economics. The course also covers the economic theory necessary to understand the many applications of economics presented in subsequent courses in city and regional planning.

CRP 5130 Introduction to Planning Practice and History

Fall. 4 credits. J. Forester.
Introductory graduate seminar on the theory and history of planning, administration, and related public intervention in urban affairs. Topics are analyzed from the perspective of the political economy of the growth and development of cities. Students improve their understanding of the planning process and of the urban application of the social sciences, get practice in writing, and explore one research topic in depth.

CRP 5170 Economic Development: Firms, Industries, and Regions (also CRP 4170)

Fall. 4 credits. S. Christopherson.
For description, see CRP 4170.

CRP 5180 Politics of Community Development (also CRP 3180)

Spring. 3 credits. A. Sanchez.
For description, see CRP 3810.

CRP 5190 Urban Theory and Spatial Development

Spring. 3 credits. W. Goldsmith.
Surveys theories on the existence, size, location, and functioning of cities and their metropolitan areas in rich and poor regions of the world. Considers orthodox/conservative treatments as well as critical/left-wing perspectives of planners, geographers, economists, sociologists, and political economists. These theories are indispensable for understanding the origins of cities, the persistence of urban and regional spatial patterns, and the distinctive nature of urban problems.

CRP 5250 Introductory Methods of Planning Analysis

Fall. 4 credits. R. Pendall.
Quantitative and qualitative analysis of neighborhoods, cities, and regions. Focus is on data from various regions of the United States, but tools are applicable throughout the world. They include descriptive and inferential statistics, mapping, and observation. Required lab exposes students to essential microcomputer applications and builds skills in writing and analysis.

CRP 5320 Real Estate Development Process

Fall. 3 credits. Letter grades. Fee for case studies packet. B. Olson.
Examination of various forms of development as well as the role of major participants in the processes. Reviews issues in residential, retail, industrial, office, and low-income housing projects. Guest speakers and case studies included.

CRP 5330 Real Estate Marketing and Management

Fall. 3 credits. Staff.
Focuses on the tenant or user as the basic source of the value of real estate. Students explore the characteristics and needs of tenants, and how the ownership and management of buildings respond to these needs. Multifamily residential and office buildings are the principal focus of the course. Topics include marketing research, examination of tenant types, locations, building services and operations, negotiation of lease agreements, marketing campaigns, and governmental regulations. Guest speakers and case studies included.

CRP 5370 Real Estate Seminar Series

Fall and spring. 0.5 credit each semester.
Prerequisite: M.P.S./R.E. students. S-U grades only. D. Funk.
Designed to bring students weekly into direct contact with real-estate professionals mainly through the use of videoconferences originating from locations around the world.

CRP 5440 Resource Management and Environmental Law (also CRP/NTRES 4440)

Spring. 4 credits. R. Booth.
For description, see CRP 4440.

CRP 5450 Inferential Statistics for Planning and Public Policy

Fall or spring. 3 credits. N. Brooks.
This course is an introduction to the inferential statistical methods and econometrics/regression analysis needed to understand empirical public policy and planning research and to do basic applied public policy analysis. The statistical concepts are illustrated using data and examples primarily from the fields of public policy and planning.

CRP 5460 Introduction to Community and Environmental Dispute Resolution

Fall or spring. 3 credits. J. Forester.
Explores the theories and techniques of dispute resolution as they apply to community, environmental, and related public-policy disputes. Analysis complements skill-building. Issues of power, participation, and strategy are central to our examinations of negotiation and mediation practice.

CRP 5530 Land-Use Regulations

Spring. 3 credits. R. Pendall.
This seminar covers the essentials of "smart growth," zoning, and subdivision and the main tools for implementing a land-use plan. Also covers agriculture and open-space preservation, infrastructure-timing controls, redevelopment, and planned-unit development.

CRP 5540 Introduction to Environmental Planning (also CRP 3540)

Fall. 3 credits. S. Schmidt.
For description, see CRP 3540.

CRP 5560 Design in Real Estate Development

Spring. 3 credits. S-U or letter grades. H. Richardson.
Provides a basic understanding of the importance of design in real estate development. The role of the architect and other design professionals is considered from the initial needs assessment through project implementation. Fundamentals involved in defining, stimulating, and recognizing quality in design are addressed. The analysis of case-study presentations by guest speakers examine the methods and procedures employed to achieve quality design and how this can create added value to development.

CRP 5590 Legal Aspects of Land Use Planning (also CRP 4590)

Spring. 4 credits. R. Booth.
For description, see CRP 4590.

CRP 5600 Documentation for Preservation

Fall. 3 credits. M. Tomlan.
Methods of identifying, recording, collecting, processing, and analyzing information dealing with historic and architecturally significant structures, sites, and objects.

CRP 5610 Historic Preservation Planning Workshop: Surveys and Analyses

Fall. 4 credits. J. Chusid.
Covers techniques for the preparation of surveys of historic structures and districts; identification of American architectural styles, focusing on upstate New York; and explorations of local historical resources, funding sources, and organizational structures. Lectures and training sessions. Emphasizes fieldwork with individuals and community organizations.

CRP 5620 Perspectives on Preservation

Fall. 3 credits. J. Chusid.
Introductory course for preservationists. A survey of the historical development of preservation activity in Europe and America leading to a contemporary comparative overview. Field trips to notable sites and districts.

CRP 5630 Problems in Contemporary Preservation Practice

Spring. Variable credit. J. Chusid.
Review and critique of ongoing preservation projects and an investigation of areas of expertise currently being developed. Presented by staff and guest lecturers.

CRP 5640 Building Materials Conservation

Spring. 3 credits. Prerequisite: junior, senior, or graduate standing. J. Chusid.
Survey of the development of building materials in the United States, chiefly during the 19th and early 20th centuries, and a review of the measures that might be taken to conserve them.

CRP 5650 Fieldwork or Workshop in History and Preservation

Fall or spring. Variable credit. Staff.
Work on applied problems in history and preservation planning in a field or laboratory setting or both.

CRP 5660 Planning and Preservation Practice

Fall. 1 credit. Prerequisite: graduate standing in CRP programs or M.P.S./R.E. or permission of instructors. S-U grades only. R. Pendall and M. Tomlan.
Students participate in field study of city planning, historic preservation, economic and community development, and real estate issues in large eastern U.S. cities.

CRP 5670 Measured Drawing

Spring. 3 credits. Prerequisite: undergraduate architecture students and graduate students in history and preservation. J. Chusid.
Combines study of architectural drawing as historical documents with exercises in preparing measured drawings of small buildings. Presents the basic techniques of studying, sketching, and measuring a building and the preparation of a finished drawing for publication.

CRP 5810 Principles of Spatial Design and Aesthetics (also CRP 3810)

Spring. 3 credits. J. Foster.
For description, see CRP 3810.

CRP 5840 Green Cities (also CRP 3840, LA 4950)

Fall. 4 credits. S-U or letter grades. Not offered every year. S. Schmidt.
For description, see CRP 3840.

CRP 6010 Public Administration (also CRP 3010)

Fall. 3 credits. Not offered every year. R. Schwarting.
For description, see CRP 3010.

CRP 6011 Ethics, Development, and Globalization (also CRP 3011)

Fall or spring. 4 credits. K. Donaghy.
For description, see CRP 3011.

CRP 6012 Legal Aspects of Public Agency Decision-Making

Fall. 4 credits. R. Booth.

This course introduces the application of legal concepts to decision-making processes conducted by governmental agencies, particularly at the federal level. It explores how constitutional law, statutory law, and judge-made law shape agency decisions. Attention is given, for example, to roles agencies play in American government, differences between rule-making proceedings and adjudications, rights of parties to obtain judicial review of agency decisions, how judges review factual and legal determinations by agency officials, and the rights of parties appearing before agencies.

CRP 6050 Urban Public Finance

Fall. 4 credits. Prerequisite: exposure to microeconomics. Not offered every year. Staff.

Overview of neoclassical public-economics theory, particularly those aspects of the theory that are central to urban public finance. The unusual three-tiered fiscal system of the United States is described along with the evolving fiscal and economic role of large municipal governments. Also presented is the public-finance theory of taxation. Major taxes and other revenue sources used by large municipalities are described and analyzed. The heart of the matter is the measurement and analysis of the fiscal condition of cities.

CRP 6101 Race, Space, and Place (also CRP 3101)

Fall or spring. 3 credits. C. Lai.
For description, see CRP 3101.

CRP 6102 Asian American Politics and Public Policy (also AAS 3900, CRP 3102)

Fall or spring. 3 credits. C. Lai.
For description, see CRP 3102.

CRP 6105 Urban Political Economy Seminar (also CRP 3105)

Fall or spring. 3 credits. C. Lai.
For description, see CRP 3105.

CRP 6111 Immigrant Entrepreneurship Markets and the U.S. City: The Latino(a) Case (also CRP 3111)

Spring. 3 credits. A. Sanchez.
For description, see CRP 3111.

CRP 6120 Devolution, Privatization, and the New Public Management (also CRP 4120, AEM 4330/6330, FGSS 4110/6110)

Fall. 4 credits. Prerequisite: ECON 1110 or equivalent. S-U or letter grades. Offered every other year. M. Warner.
For description, see CRP 4120.

CRP 6201 Qualitative Research and Design Methods (also CRP 3201)

Fall or spring. 3 credits. J. Forester.
For description, see CRP 3201.

CRP 6202 Visual Methods in Planning (also CRP 3202)

Spring. 3 credits. Staff.
For description, see CRP 3202.

CRP 6210 Quantitative Techniques for Policy Analysis and Program Management

Spring. 4 credits. D. Lewis.
Examines selected analytical techniques used in the planning and evaluation of public policy and public investments. Topics include simulation modeling, benefit-cost and cost-effectiveness analysis (including capital budgeting), and optimization strategies.

CRP 6220 Planning Policy and Analysis

Spring. 3 credits. I. Azis.
The course is designed to familiarize students with the essence of planning models and equip them with analytical tools to undertake a practical quantitative policy and planning analysis. Two categories of models to be discussed are: (1) economy-wide models that capture complete interactions between economic and social indicators such as income distribution and poverty; and (2) non-Bayesian decision-making models that combine intangibles and subjective judgments with statistical data and other tangible actors, and that can also capture feedback influences.

CRP 6302 Economics of Financial Crises (also NBA 5950)

Spring. 3 credits. I. Azis.
Understanding the causes, nature, and consequences of financial crises is of interest to both the public and private sector. The purpose of this course is to help students with such understanding, and to familiarize them with the relevant tools for analyzing the phenomena of financial crises. While crisis is often multidimensional, the focus of this course is on economics.

CRP 6311 Consulting for Nonprofit and Government Organizations

Fall and spring. 4 credits. L. Haas-Manley.
This class teaches practical skills that will enable students to work with clients in the local community, learn about organizational structure and culture, and gain real-world experience as they complete a public-service project. Students receive instruction on topics such as organizational development, program evaluation, project management, professional communication, and strategic planning. A significant portion of the course will focus on project management.

CRP 6320 Methods of Regional Science and Planning I

Spring. 4 credits, variable. K. Donaghy.
Introduction to some of the major methods and models used in regional science and planning. Topics related to the structure and assumptions of the models, model development, and their applications in regional science and planning are discussed. Where appropriate, computer implementation emphasizing statistical, econometric models is considered.

CRP 6390 Economics of Financial Crises (also NBA 5950)

Spring. 3 credits. I. Azis.
Understanding the causes, nature, and consequences of financial crises is of interest to both the public and private sector. The purpose of this course is to help students with such understanding, and to familiarize them with the relevant tools for analyzing the phenomena of financial crises. While crisis is often multidimensional, the focus of this course is on economics.

CRP 6430 Affordable Housing Policy and Programs (also CRP 3430)

Fall. 3 credits. S-U or letter grades. R. Pendall.
For description, see CRP 3430.

CRP 6502 Suburbia (also CRP 3502)

Fall or spring. 3 credits. Staff.
For description, see CRP 3502.

CRP 6503 Comparative Land Use Policy

Fall or spring. 3 credits. Staff.

Graduate seminar in which students conduct guided, often collaborative, research on contemporary land-use planning and policy issues in comparative international perspective. Topics may include sustainable development, conservation, revitalization of urban cores, and land use-transportation connections, among others.

CRP 6504 Comparative Urban Development (also CRP 3504)

Fall or spring. 3 credits. S. Schmidt.
For description, see CRP 3504.

CRP 6506 Environmental Planning Seminar: Wilderness and Wildlands (also CRP 3506)

Fall or spring. 2–3 credits, variable.
E. Thorndike.
For description, see CRP 3506.

CRP 6560 Real Estate Transactions and Deal Structuring (also LAW 6792)

Spring. 3 credits. S–U or letter grades.
D. Funk.

Real estate transactions and deal structuring examines real estate deals through a practitioner perspective within a case study and transactional approach. The course looks at the transactional components and structuring of real estate deals and related parties at each step in creating value from real estate, including acquisition and assemblage; due diligence; sourcing and financing; structuring the venture/parties; operation; disposition; and tax consequences. Additional issues within deal structuring that may be included are negotiation, managing risk including litigation and environmental issues, analysis of financing techniques, and consequences when deals go bad, including work out and bankruptcy. The case study format will address deals from the perspectives of investment fund manager, banker/lender, developer, REIT, joint venture partner/investor, and owner.

CRP 6570 Real Estate Law

Spring. 3 credits. Letter grades.
A. Klausner.
Examination of major legal concepts pertaining to acquisition, use, management, and transfer of real estate. Particular focus is on important legal considerations pertaining to property rights, contracts, and public controls on the use of land. Consideration of important case law, statutory law, and rules and regulations. Current legal issues affecting the real estate industry are discussed.

CRP 6580 Residential Development

Spring. 4 credits. Letter grades. Fee for mandatory field trip. B. Olson.
Explores the residential-development process from site acquisition through delivery of the finished product. Topics include market feasibility, land planning and acquisition, product selection and design considerations, project financing and feasibility, schedule and budgetary controls, contracting and construction issues, marketing, and sales activities. Current issues in providing competitive housing products in today's markets are also explored. Composition of the residential-development project team is discussed. Classes are supplemented by presentations from visiting professionals. The course includes a semester-long project based on an actual property and market opportunity.

[CRP 6601 Museum and the Public (also CRP 3601)]

Spring. 3 credits. Next offered 2010–2011.
J. Chusid.
For description, see CRP 3601.]

CRP 6602 American Planning History (also CRP 3602)

Fall. 3 credits. P. Clavel.
For description, see CRP 3602.

CRP 6610 Seminar in American Urban History (also CRP 3610)

Fall or spring. 3 credits. Prerequisite: permission of instructor. M. Tomlan.
For description, see CRP 3610.

CRP 6630 Historic Preservation Law

Spring. 3 credits. Offered every other year.
Staff.

Covers law of historic district and landmark designation; tools for preservation (e.g., police power, taxation, eminent domain); and recent developments in state and federal historic preservation.

CRP 6650 Preservation Planning and Urban Change

Fall. 3 credits. M. Tomlan.
Examination of fundamental planning concepts and issues as they relate to historic preservation. Neighborhood revitalization, federal housing programs, the role of public and private institutions, displacement, and other social issues are among the primary topics.

CRP 6700 Regional Planning and Development in Developing Nations

Fall or spring. 4 credits. Prerequisite: second-year graduate standing.
M. Gonzalez.

Extensive case studies of development planning are analyzed. Focus is on the political economy of the process of regional development through urbanization and in particular on the concepts of equity and efficiency, external economies, export linkages, and internal self-sufficiency and integration. Resource development, national integration, human development, and migration problems are discussed.

CRP 6710 Seminar in International Planning

Spring. 1 credit. S–U grades only.
W. Goldsmith.
The international planning lecture series sponsors lectures by visiting scholars or professionals in the field of international development and planning. The only formal requirement for the course is a brief evaluation of the series at the end of the semester.

CRP 6711 Italy and the European Union (also CRP 3721)

Spring. 4 credits. M. Cremaschi.
For description, see CRP 3721.

CRP 6720 International Institutions

Fall. 3 credits. L. Benería and M. Gonzales.
Focuses on the growth and transformation of international institutions since World War II. The first part includes a discussion of the Bretton Woods institutions and of the U.N. system up to the early 1970s, and how these function and have evolved over time. The second part examines some of the crises and tensions within the international system since the 1980s and how these have affected institutional change and current debates on reform and global governance.

CRP 6760 Latin American Cities (also CRP 3760)

Fall. 3 credits. A. Sanchez.
For description, see CRP 3760.

CRP 6770 Issues in African Development (also CRP 4770)

Fall or spring. 1 credit. S–U grades only.
M. Ndulo.
For description, see CRP 4770.

CRP 6801 Asian American Urban Experience (also CRP 3801)

Fall or spring. 3 credits. C. Lai.
For description, see CRP 3801.

CRP 6860 Planning for Sustainable Transportation (also CRP 3860)

Spring. 3 credits. S–U or letter grades. Not offered every year. Staff.
For description, see CRP 3860.

CRP 6901 Real Estate Review

Fall and spring. Variable 1–2 credits.
D. Funk.
Real Estate Review is for students undertaking a research project culminating in an article worthy of publication in the *Cornell Real Estate Review*.

CRP 7770 Theories of Development and Underdevelopment

Fall or spring. 4 credits. P. Olpadwala.
Various theories attempting to analyze and explain the phenomena of underdevelopment are examined. Although a range of thought and approaches are considered, the accent is on aspects of political economy revolving around concepts of class and exploitation. Topics include the transition of capitalism; dependent and uneven development; various issues of growth and fluctuation under contemporary capitalism, including crisis; rural and industrial development in less developed countries, and planning for development.

CRP 7850 Professional Planning Colloquium I (also CRP 3900)

Fall. 1 credit. Staff.
For description, see CRP 3900.

CRP 7940 Planning Internships

Fall, spring, or summer. 12 credits, variable. Staff.
Combines a professional planning internship in a metropolitan area with academic study to provide experience and understanding of the planner's role in formulating and implementing plans and policies. Salaried internships in federal or state agencies, legislative offices, and comparable settings include development of research, analysis, and other technical skills. Weekly seminars draw on student field experiences, assigned readings, and guest speakers to examine current issues of federal, urban, and regional policy from the perspective of planning practice.

CRP 7970 Graduate Independent Study

Fall or spring. 4 credits, variable.
Prerequisites: graduate student standing, permission of instructor. Staff.
For description, see department coordinator, 106 West Sibley Hall.

CRP 8000 Advanced Seminar in Urban and Regional Theory I

Fall. 3 credits. S. Christopherson.
Introduction to key conceptual and empirical literature in urban theory. Focuses on the relationship between political and economic processes and their joint influence on urban spatial form.

CRP 8010 Advanced Seminar in Urban and Regional Theory II

Fall or spring. 3 credits. K. Donaghy.
This course will survey traditional and more recent explanations of the location, aggregation, and fragmentation of economic activities in space under different assumptions about the mobility of factors, transportation (or more generally, transaction) costs, economies of scale, and the competitiveness of markets. The relationship between theories of trade and location will be considered, as will the effects on spatial economies of policy interventions.

CRP 8100 Advanced Planning Theory

Fall. 3 credits. Staff.
A survey of the works of scholars who have contributed to current thinking about planning theory. Alternative assumptions concerning models of man and theoretical concepts concerning the nature of planning today are considered.

CRP 8300 Seminar in Regional Science, Planning, and Policy Analysis

Fall or spring. 4 credits, variable. S-U grades only. K. Donaghy.
CRP 8300 is a weekly seminar at which faculty, students, and visitors present their research on topics of current interest. Presentations usually involve formal or quantitative analyses of developments in regional economies and policy or planning implications.

CRP 8900 Planning Research Seminar I

Fall or spring. 2 credits. Staff.
Intended for doctoral candidates in city and regional planning; other students welcome. Presentation and discussion of current problem areas and research by advanced doctoral students, faculty members, and visitors.

CRP 8910 Master's Thesis in Regional Science

Fall or spring. 12 credits, variable. S-U or letter grades. Hours TBA. Regional Science faculty. Staff.

CRP 8920 Master's Thesis, Project, or Research Paper

Fall or spring. 10 credits, variable. S-U or letter grades. Staff.

CRP 8950 Master's Thesis in Preservation Planning

Fall or spring. 6 credits, variable. Staff.

CRP 9920 Doctoral Dissertation

Fall or spring. 12 credits, variable. Staff.

Special Topic Courses

Fall or spring. Variable credit. Staff.
Typical topics are:

CRP 6090 Urban and Regional Theory**CRP 6190 Planning Theory and Politics****CRP 6290 Quantitative Methods and Analysis****CRP 6390 Regional Development Planning****CRP 6490 Social-Policy Planning****CRP 6590 Urban Development Planning****CRP 6690 History and Preservation****CRP 6790 Planning and Developing Regions****CRP 6890 Environmental Planning****CRP 6990 Regional Science****CRP 7190 Planning Theory and Politics****LANDSCAPE ARCHITECTURE**

Landscape Architecture at Cornell is jointly sponsored by the College of Agriculture and Life Sciences and the College of Architecture, Art, and Planning.

The Program

Program faculty: P. J. Trowbridge, chair (443 Kennedy Hall, 255-2738); S. Baugher, K. L. Gleason, A. Hammer, P. Horrigan, D. W. Krall, L. J. Mirin, A. Okisbo, D. Ruggeri.

Landscape Architecture offers a three-year master of landscape architecture license qualifying degree, administered through the Graduate School, for those who have a four-year undergraduate degree in another field. The major is composed of several parts: core courses related to professional education in landscape architecture; a concentration in a subject related to the core courses; and free electives. Requirements of the three-year M.L.A. curriculum include 90 credits, six resident units, satisfactory completion of the core curriculum courses, and a thesis or a capstone studio.

The department also offers a two-year master of landscape architecture advanced degree program, administered through the Graduate School, for those with accredited degrees in landscape architecture or architecture. The two-year program entails core courses in the discipline and the development of concentrations in subject-matter areas such as landscape history and theory, landscape ecology and urban horticulture, the cultural landscape, site/landscape and art, or urban design.

Both of these degrees are accredited by the Landscape Architecture Accreditation Board (LAAB) of the American Society of Landscape Architects.

Dual-Degree Options

Graduate students can earn a master of landscape architecture and a master of science (horticulture) or a master of city and regional planning simultaneously. Students need to be accepted into both fields of study to engage in a dual-degree program and must fulfill requirements of both fields of study. Thesis requirements are generally integrated for dual degrees.

Course Information

Note: Landscape Architecture courses are offered through the College of Agriculture and Life Sciences except LANAR 4970, 5240, and 5250. For complete course offerings, see Landscape Architecture course listings on pages 110-113 of this catalog.

LANAR 4970 Individual Study in Landscape Architecture

Spring. 1-5 credits; may be repeated for credit. S-U or letter grades. L. J. Mirin.
Work on special topics by individuals or small groups.

LANAR 5240 History of European Landscape Architecture

Fall. 3 credits. L. Mirin.

Survey from classical times to the present, emphasizing design principles and techniques that have established the landscape architecture tradition in Europe. Particular reference is made to the manner in which gardens, streets, plazas, parks, and new towns reflect in their built form, a range of responses to demands of culture, economics, technology, security, the law, and ecology.

LANAR 5250 History of American Landscape Architecture

Spring. 3 credits. L. Mirin.
Landscape architecture in the United States from Jefferson to the present is examined as a unique expression of the American experience. Influences exerted by the physical landscape, the frontier and utopian spirit, and the cultural assumptions of democracy and capitalism are traced as they affect the forms of urban parks, private and corporate estates, public housing, transportation planning, national parks, and other open-space designs.

FACULTY ROSTER

Ashkin, Michael, M.F.A., The School of the Art Inst. of Chicago. Asst. Prof., Art
Azis, Iwan, Ph.D., Cornell U. Visiting Prof., City and Regional Planning.
Baugher, Sherene, Ph.D., SUNY, Stony Brook. Visiting Prof., City and Regional Planning
Benería, Lourdes, Ph.D., Columbia U. Prof., City and Regional Planning
Bertoia, Roberto, M.F.A., Southern Illinois U. Assoc. Prof., Art
Blum, Zevi, B. Arch., Cornell U. Prof. Emeritus, Art
Booth, Richard S., J.D., George Washington U. Prof., City and Regional Planning
Bowman, Stanley J., M.F.A., U. of New Mexico. Prof. Emeritus, Art
Chi, Lily H., Ph.D., McGill U. (Canada). Assoc. Prof., Architecture
Christopherson, Susan M., Ph.D., U. of California, Berkeley. Prof., City and Regional Planning
Chusid, Jeffrey, M.Arch., U. of California, Berkeley. Assoc. Prof., City and Regional Planning
Clavel, Pierre, Ph.D., Cornell U. Prof., City and Regional Planning
Colby, Victor E., M.F.A., Cornell U. Prof. Emeritus, Art
Crump, Ralph W., B. Arch., Cornell U. Prof. Emeritus, Architecture
Cruvellier, Mark R., M.Eng., Ph.D., McGill U. (Canada). Assoc. Prof., Architecture
Curry, Milton S. F., M. Arch., Harvard U. Assoc. Prof., Architecture
Czamanski, Stan, Ph.D., U. of Pennsylvania. Prof. Emeritus, City and Regional Planning
Donaghy, Kiernan, Ph.D., Cornell U. Prof., City and Regional Planning
Drennan, Matthew P., Ph.D., New York U. Prof. Emeritus, City and Regional Planning
Forester, John, Ph.D., U. of California, Berkeley. Prof., City and Regional Planning
Forsyth, Ann, Ph.D., Cornell U. Prof., City and Regional Planning
Goehner, Werner H., M. Arch., Cornell U. Prof., Architecture
Goldsmith, William W., Ph.D., Cornell U. Prof., City and Regional Planning
González, Marcela, Ph.D., U. of North Carolina, Chapel Hill. Post-doctoral Fellow, City and Regional Planning
Greenberg, Donald P., Ph.D., Cornell U. Prof., Architecture

- Hammer, Andrea G., Ph.D., M.F.A., U. of California, Davis. Sr. Lec., Landscape Architecture
- Hascup, George E., B. Arch., U. of California, Berkeley. Prof., Architecture
- Hubbell, Kent L., M.F.A.S., Yale U. Prof., Architecture
- Isard, Walter, Ph.D., Harvard U. Prof. Emeritus, City and Regional Planning
- Kiely, Richard, Ph.D., Cornell U. Visiting Asst. Prof., City and Regional Planning
- Kord, Victor, M.F.A., Yale U. Prof. Emeritus, Art
- Kudva, Neema, Ph.D., U. of California, Berkeley. Asst. Prof., City and Regional Planning
- Lai, Clement, Ph.D., U. of California, Berkeley. Asst. Prof., City and Regional Planning
- Lasansky, D. Medina, Ph.D., Brown U. Assoc. Prof., Architecture
- Lewis, David B., Ph.D., Cornell U. Prof., City and Regional Planning
- Locey, Jean N., M.F.A., Ohio U. Prof., Art
- MacDougall, Bonnie G., Ph.D, Cornell U. Assoc. Prof., Architecture
- Mackenzie, Archie B., M. Arch., U. of California, Berkeley. Assoc. Prof., Architecture
- McGrain, Todd V., M.F.A., U. of Wisconsin. Assoc. Prof., Art
- Meyer, Elisabeth H., M.F.A., U. of Texas. Assoc. Prof., Art
- Mikus, Eleanore, M.A., U. of Denver. Prof. Emeritus, Art
- Miller, John C., M. Arch., Cornell U. Prof. Emeritus, Architecture
- Mirin, Leonard J., M.L.A., U. of Michigan. Assoc. Prof., Landscape Architecture
- Mulcahy, Vincent J., M. Arch., Harvard U. Assoc. Prof., Architecture
- Nettleton, John, M.C.P., U. of Pennsylvania. Sr. Lec., City and Regional Planning
- Ochshorn, Jonathan, M.Urb.Des., City Coll. of New York. Assoc. Prof., Architecture
- Olpadwala, Porus, Ph.D., Cornell U. Prof., City and Regional Planning
- Otto, Christian F., Ph.D., Columbia U. Prof., Architecture
- Ovaska, Arthur, M. Arch., Cornell U. Assoc. Prof., Architecture
- Page, Gregory, M.F.A., U. of Wisconsin. Assoc. Prof., Art
- Park, Maria Y., M.F.A., San Francisco Art Inst. Asst. Prof., Art
- Pearman, Charles W., B. Arch., U. of Michigan. Prof. Emeritus, Architecture
- Pendall, Rolf, Ph.D., U. of California, Berkeley. Assoc. Prof., City and Regional Planning
- Perlus, Barry A., M.F.A., Ohio U. Assoc. Prof., Art
- Phillips, Patricia C., ABT, U. of Wisconsin, Madison. Prof., Art
- Poleskie, Stephen F., B.S., Wilkes Coll. Prof. Emeritus, Art
- Pratt, Kevin B., M.A.S., Archit. Assoc., School of Arch., London (England). Asst. Prof., Architecture
- Reardon, Kenneth, Ph.D., Cornell U. Assoc. Prof., City and Regional Planning
- Reps, John W., M.R.P., Cornell U. Prof. Emeritus, City and Regional Planning
- Richardson, Henry W., M.R.P., Cornell U. Prof., Architecture
- Rickard, Jolene, Ph.D., SUNY Buffalo. Assoc. Prof., Art/History of Art/American Indian Program
- Ruggeri, Deni, M.L.A., M.R.P., Cornell U. Asst. Prof., Landscape Architecture
- Saltzman, Sid, Ph.D., Cornell U. Prof. Emeritus, City and Regional Planning
- Schack, Mario L., M. Arch., Harvard U. Arthur L. and Isabel B. Wiesenberger Prof. Emeritus, Architecture
- Schmidt, Stephan, Ph.D., Rutgers U. Asst. Prof., City and Regional Planning
- Shaw, John P., M. Arch., Massachusetts Inst. of Technology. Prof. Emeritus, Architecture
- Silver, Michael S., M.S., Columbia U. Asst. Prof., Architecture
- Simitch, Andrea, B. Arch., Cornell U. Assoc. Prof., Architecture
- Spector, Buzz, M.F.A., U. of Chicago. Prof., Art
- Squier, Jack L., M.F.A., Cornell U. Prof. Emeritus, Art
- Stein, Stuart W., M.C.P., Massachusetts Inst. of Technology. Prof. Emeritus, City and Regional Planning
- Taft, W. Stanley, M.F.A., California Coll. of Arts and Crafts. Assoc. Prof., Art
- Tomlan, Michael A., Ph.D, Cornell U. Assoc. Prof., City and Regional Planning
- Trancik, Roger T., M.L.A.-U.D., Harvard U. Prof., Landscape Architecture/City and Regional Planning
- WalkingStick, Kay, M.F.A., Pratt Inst. Emeritus Prof., Art
- Warke, Val K., M. Arch., Harvard U. Assoc. Prof., Architecture
- Warner, Mildred, Ph.D., Cornell U. Prof., City and Regional Planning
- Wells, Jerry A., B. Arch., U. of Texas. Prof., Architecture
- Woods, Mary N., Ph.D., Columbia U. Assoc. Prof., Architecture
- Zissovici, John, M. Arch., Cornell U. Assoc. Prof., Architecture

DEPARTMENT OF ATHLETICS AND PHYSICAL EDUCATION

ADMINISTRATION

Alan E. Gantert, director

COURSES

The courses and fees described in this catalog are subject to change or cancellation at any time by official action of Cornell University. For current fee information on physical education courses, call 255-4286; for outdoor education courses, call 255-6183 or visit www.coe.cornell.edu.

Enrollment in any course is limited by the space available. Other restrictions are included in the course description. Most courses are coeducational. The specific time and place of class meetings, as well as information about fees, are available at the physical education course registration or may be found on "Bear Access," a package of software for accessing a variety of network services at Cornell. Course fees are billed through the Office of the Bursar.

Additional course offerings may be listed at registration, as the curriculum is frequently reviewed and changed. Drop deadlines for outdoor education courses are earlier than university deadlines, and often earlier than physical education deadlines. Cornell Outdoor Education (COE) courses may be added any time by calling 255-6183, or registering at www.coe.cornell.edu.

Aquatic Courses

PE 1100 Swimming, Beginning

Fall, spring, and summer (six weeks). Instruction and practice in skills leading to passing the basic swimming proficiency test.

PE 1101 Swimming, Advanced Beginning

Spring. Ideal for all who have taken one semester of Beginning Swimming, regardless of whether the test was successfully completed. Areas of special emphasis are the crawl stroke and rotary breathing, back crawl, elementary backstroke, diving, treading water, and underwater swimming. The primary objective is to strengthen the student's confidence and competence.

PE 1102 Swimming, Intermediate

Fall and spring. Practice of basic skills and five basic strokes: front crawl, back crawl, elementary backstroke, breaststroke, sidestroke.

PE 1103 Swimming, Advanced

Fall and spring. Practice of nine strokes: front crawl, back crawl, elementary backstroke, breaststroke, inverted breaststroke, sidestroke, overarm sidestroke, trudgeon, and butterfly.

PE 1104 Swimming Conditioning

Fall and spring. Prerequisite: reasonable swimming ability. Introduction to, and practice of, different training methods. Final objective: to swim 2,500 yards during class period. Primarily a conditioning and not an instructional course.

PE 1105 Springboard Diving

Fall and spring. Introduction on the safe and effective use of a diving board to and practice of the five basic dives: forward dive, back dive, inward dive, reverse dive, and 1/2 twist dive.

PE 1110 Lifeguard Training

Fall and spring. Fee charged. Prerequisite: swimming test consisting of 500 yards, demonstrating three strokes, treading water without the use of hands, and retrieving a brick from 7 feet of water. Three classes per week.

American Red Cross certification course. Practice and execution of lifeguarding first aid and CPR skills and techniques. Certification is awarded in lifeguarding, first aid, O₂, AED, and CPR upon satisfactory completion of the course.

PE 1111 Lifeguard Training Instructor

Spring. Fee charged. Prerequisites: current Red Cross ICT or instructor card, written and skill tests in lifeguarding, first aid, and CPR techniques. Students must not miss first class. 2 classes a week.

American Red Cross lifeguarding instructor and CPR-FPR certifications are awarded upon successful completion.

PE 1120 Water Safety Instructor

Spring. Fee charged. Prerequisite: passing of written and skill water tests given on first day. American Red Cross water safety instructor certification is awarded upon satisfactory completion of the course. This is not a course for a casual participant. Approximately 45 hours of work is required.

PE 1130 Scuba, Open-Water

Fall, spring, and summer (six weeks). Fee charged. Program includes classroom work, skill training in a pool, and open-water training in Cayuga Lake. P.A.D.I. open-water certification awarded upon successful completion.

PE 1131 Scuba, Advanced Open-Water

Fall and spring. For those who have completed open-water course. Fee charged. Advanced-level open-water training in Cayuga Lake.

PE 1132 Rescue Diver

Fall and spring. For those who have completed Advanced Open-Water Scuba certification. Fee charged. Advanced course for scuba divers interested in learning rescue and safety techniques.

PE 1133 Dive Master

Fall and spring. Open only to those who have completed Rescue Diver course. Fee charged. Advanced-level scuba course. Note: This is a long, time-consuming course, which requires the student to be in good physical and swimming shape.

PE 1134 Scuba Diving Trips

Spring, offered during spring intersession period. Fee charged.

Scuba trips to various destinations such as the Bahamas. Locations change from year to year. See the information sheet at the registration table.

PE 1135 Specialty Scuba Diving

Fall and spring. Fee charged. Courses offered in the following specialty diving areas: navigation, search and recovery, night diving, deep diving, underwater photography, wreck, multi-level, boat, tropical fish identification and buoyancy control, and underwater naturalist.

Bowling Courses

PE 1300 Bowling

Fall and spring. Fee includes shoe rental. For the beginning and intermediate bowler.

PE 1301 Intermediate Bowling

Fall and spring. Fee charged. For players with previous bowling experience (e.g., bowling classes, YABA, tournament). Skills emphasized are timing, balance, and release.

Dance Courses

Develop flexibility, coordination, and the ability to perceive and reproduce phrases of dance movement with rhythmic accuracy, clarity of body design, and fullness of feeling. Auditions are required for admission to all advanced courses, since they require the mental and physical ability to perform more complex phrases in various styles.

PE 1150 Ballroom Dancing

Fall, spring, and summer. Fee charged. Students and their partners must sign up at course registration. Includes instruction in the waltz, swing, cha cha, calypso, tango, and others.

PE 1151 Intensive Ballroom Dance

Fall and spring. Fee charged. Ballroom Intensive class examines three social dance styles in depth each semester. The course is geared to students who enjoy a challenge, and who are seeking more depth and breadth than offered in a survey course. No dance experience is necessary to enroll; the basics are covered each semester.

PE 1155 Belly Dancing I

Fall and spring. Fee charged. Belly dancing is an exciting Middle Eastern folk art that can help in the development of flexibility, body awareness, and overall body tone. The class begins with warm-ups and continues with basic movements and rhythms, then puts them together in a dance to music of the Middle East.

PE 1156 Belly Dancing II

Spring. Fee charged.

Advanced belly dance movements and combinations that include putting basic and advanced movements to the Beledi, Masmouodi, and Karsilma dance rhythms of the Middle East. A drum solo, taqsim (fluid, graceful movements of the arms and hands), floor work (level changes with the dance), and techniques in playing finger cymbals are also a part of this class.

PE 1160 Latin Dance

Fall and spring. Fee charged. Partner sign-in required. This is an introductory course that teaches salsa, mambo, Latin, and meringue. Emphasis on listening, feeling, and expressing Latin rhythms with precise detail and technique.

PE 1161 Latin-Israeli Dance

Fall and spring. Covers some of the hundreds of dances that make up Latin-Israeli dancing and the thousands of dances that make up Israeli dancing, with a clear emphasis on the dances of the past 10 years.

PE 1162 Intermediate Salsa and Rueda de Casino Dance

Fall and spring. Prerequisite: Latin Dance or permission of instructor. The first half of the course will concentrate on more complex open step patterns and partnered and non-partnered combinations. The second will transition into a "Dancing Wheel."

PE 1165 International Ethnic Dance

Fall and spring. This class covers the popular traditional dances from around the world, including line, circle, partner and individual forms. Now is your chance to move to the exotic beats from the Balkans and Near East, whirl to Scandinavian tunes, sway with sultry Latin American sounds, swing to historic and contemporary American folk rhythms, and much more. No experience or partner necessary.

PE 1166 Spanish Folk Dance

Fall and spring. The Sevillanas is danced in pairs—man and woman or two women. It is a popular dance mainly at fairs and festivals and it is the dance usually taught first when learning the Flamenco.

PE 1167 Introduction to Tango

Fall and spring. Introduction to the fundamentals of Tango dancing and its origins. Focus is on movement on the dance floor and how to be connected to your partner. Other aspects include learning to differentiate between the genres of Tango music (Tango, Milonga, Candombe, and Vals).

PE 1170 Introduction to Swing Dance

Fall and spring. Fee charged. No partners are needed. Beginners can expect to develop significant capacity for enjoyment of two forms of swing dance: jitterbug and street boogie. Partners are rotated throughout the course. Effort are made at registration to equalize male and female ratios.

PE 1171 Swing Dance II

Fall and spring. Fee charged. For those who have taken the introductory course.

PE 1172 Swing Dance III

Spring. Fee charged. A solid Lindy Hop I & II sequence in the tradition of Frankie Manning and Steven Mitchell (includes Intermediate Charleston, Jazz, and Fast Lindy). Dancing more deeply into the music, styling for leaders and followers, improvisation skills. Partner recommended, but not necessary.

PE 1180 Dance Technique I (also THETR 1240)

Fall and spring.

PE 1181 Exploration in Movement and Performance (also DANCE 2410)

Fall and spring.

PE 1182 Dance Technique II (Classical) (also DANCE 2210)

Fall and spring.

PE 1183 Dance Technique II (Modern) (also DANCE 2220)

Fall and spring.

PE 1184 Dance Technique III (Classical) (also DANCE 2310)

Fall and spring.

PE 1185 Dance Technique III (Modern) (also DANCE 2320)

Fall and spring.

PE 1186 Dance Technique IV (Classical) (also DANCE 2410)

Fall and spring.

PE 1187 Dance Technique IV (Modern) (also DANCE 2420)

Fall and spring.

PE 1188 Dance Technique Workshop (also DANCE 2240)

Fall and spring.

PE 1189 Hip Hop Hollywood (also DANCE 2430)

Fall and spring.

PE 1190 Indian Dance (also DANCE 1320)

Fall and spring.

First Aid/CPR Courses**PE 1202 Certified First Responder**

Fall. Fee charged. CFR is an intensive 52-hour course that requires studying and examinations. Course includes training in basic patient assessment, CPR for the Professional Rescuer, and automatic external defibrillation, oxygen administration, basic airway management, bleeding control, and spinal immobilization. Students will qualify for the New York State CFR Certification Exam upon successful completion of the course.

PE 1203 NYS EMT Refresher

Spring. Fee charged. EMT-B refresher is an intensive course that will renew your certification upon successful completion of all NYS DOH requirements. Students will have the opportunity to challenge the NYS Practical Skills Examination and the course written examination at the beginning of the class. All students must pass a CPR for the Professional Rescuer course within the class. To complete the class and renew certification, students must also pass the NYS Practical Skills Examination and the NYS written examination.

PE 1210 NYS Emergency Medical Technician—Basic

Two-semester course. Fee charged. Intensive 130-hour course taught throughout both the fall and spring semesters. Includes training in CPR for the Professional Rescuer, oxygen administration, airway management, fracture management, bleeding control, expanded patient assessment, spinal immobilization, medical anti-shock trousers, and defibrillation. Students qualify for the NYS EMT Certification Exam upon successful completion of this course. Rigid attendance and participation requirements are strictly enforced.

PE 1211 NYS Emergency Medical Technician—Critical Care

Two-semester course. Prerequisite: current certification as NYS EMT. Fee charged. Intensive 160-hour course taught throughout both fall and spring semesters. Includes training in CPR for the Professional Rescuer, oxygen administration, airway management, fracture management, bleeding control, expanded patient assessment, spinal immobilization, medical anti-shock trousers, manual defibrillation, EKG interpretation, pharmacology, and IV administration. Clinical rotations, in the field and hospital, are also required. Students qualify for the New York State AEMT-CRITICAL CARE certification exam upon successful completion of the course. Attendance and participation requirements are strictly enforced.

Fishing Courses**PE 1310 Introduction to Freshwater Angling**

Fall. Fee charged. Acquaints the student with freshwater spinning, casting, and fly fishing equipment; tackle; and techniques through on-the-water experiences. It also seeks to promote an awareness of the angling opportunities that exist close to Cornell and in the Finger Lakes region of New York. The course consists of an orientation and outings to various locations around the area such as Cayuga Lake and the Susquehanna River.

PE 1311 Fly Fishing and Basic Fly-Tying Techniques

Fall and spring. Fee charged. Learn the art of tying several of your own artificial flies while you learn the art of fly casting. Students must have a valid NYS fishing license and their own wader boots. All other materials provided.

Fitness Courses**PE 1230 Cardio Combo**

Fall, spring, and summer (six weeks). Fee charged. Dance program designed to keep the cardiovascular system in top shape by making the body demand increased amounts of oxygen.

PE 1231 Aerobic Instructor

Fall. Fee charged. Helps prepare the student to teach aerobics and prepares them for the AFAA Primary Aerobic Instructor or Step Certification. Topics include the theory behind all basic components of a good class, applications, and practical uses in the class settings.

PE 1232 Aerobic Instructor Apprentice

Spring. Fee charged. Prerequisite: Aerobic Instructor course.

This class is a necessary component to finishing the Aerobic Instructor certification.

PE 1233 Bootcamp

Fall and spring. Fee charged. Designed as a modern military-style workout program with an emphasis on both aerobic and anaerobic fitness.

PE 1235 8 O'Clock Rock

Fall and spring. Fee charged. Combines the best of the principles of weight training and cardio training.

PE 1240 Pilates Mat Work

Fall and spring. Fee charged. Conditioning program designed to increase body awareness, improve alignment and breathing, and build endurance, flexibility, coordination, and strength through a highly focused flow of movement.

PE 1245 Spinning

Fall and spring. Fee charged. Indoor stationary cycling class that combines basic cycling movements with motivational coaching, breathing awareness, and heart rate training.

PE 1260 Cardio Kickboxing

Fall and spring. Fee charged. Cardio kickboxing is a series of movements that consists of kicks, punches, and blocks done to music. It is similar to a typical aerobics class except the moves consist of martial arts techniques.

PE 1261 Fitness and Conditioning

Fall and spring. Physical fitness program that embodies features of stretching exercises, weight lifting, and jogging. Students work on their individual training needs.

PE 1262 Fitness for Women

Fall and spring. Includes both lecture and physical activity. Students are presented with a variety of topics and information that involves physical fitness and health. Each student will learn to design a fitness program that is geared toward her own interests and abilities. Topics include: nutrition, time management, relaxation techniques, and stress management. Activities will include aerobic dance, walking, jogging, weight training, flexibility exercises, relaxation and stress management routines, and yoga techniques.

PE 1265 Wellness and Fitness

Fall and spring. Fee charged. "Here's to a Healthier You"—a wellness experience for the busy student. This course assesses the student's physical fitness status, blood-cholesterol levels, and overall lifestyle health habits. Each student receives an individual exercise prescription and has access to the Wellness Program fitness room in Helen Newman Hall. Lectures on nutrition and stress management are also presented. This course has been made possible through the generosity of the Bateman family in memory of Ms. Dorothy Bateman, Cornell's first director of women's sports and physical education (1920 to 1962).

PE 1270 Jogging

Fall and spring. Covers running and stretching techniques. It comprises a conditioning program with the objective to develop the capacity to run 3 miles after 12 weeks of training.

PE 1271 Jogging Tours—Distance Running

Fall. Designed for the intermediate runner who can run an average of 3 miles in 30 minutes. Most tours are 3–4 miles long and go through campus and nearby countryside.

PE 1272 Walking Tours

Fall and spring. A series of walking tours around the Cornell campus and beyond.

PE 1273 Walking Meditation

Fall and spring. This course combines walking and meditation, two life enhancing activities that can help students create balance in their hectic lives. Walking is the optimum exercise for optimum health and meditation one the chance to calm an active and busy mind.

PE 1275 Triathlon

Fall and spring. Designed to acquaint students with the components of, and conditioning for, triathlon (running, swimming, and bicycling).

Equitation Courses**PE 1305 Basic, Intermediate, Advanced**

Fall, spring, and summer (six weeks). Fee charged. All riding classes are held at the Cornell Equestrian Center located on Pine Tree Road near East Hill Plaza. Detailed information will be offered by the equitation staff at the registration sign-up table. Basic—never ridden; Intermediate I—completed basic with knowledge of walk/trot/canter; Intermediate II—walk/trot/canter with control over two-foot-high jumping course; Advanced—strong jumping/dressage skills with experience hunting/showing/eventing. Students must fill out a release form to participate in any riding class.

Golf Courses**PE 1320 Golf, Instructional**

Fall and spring. Fee charged. Equipment furnished.

PGA program of instruction geared to all levels of experience and ability. The objective is to give beginners enough skill to play, and to give more advanced players direction in their thinking, practice, and play, through a thorough understanding of fundamentals.

PE 1321 Golf, Recreational

Fall and spring. Prerequisite: experienced golfers. Fee covers a semester's membership. Students must provide clubs. Students must play a minimum of 10 rounds of nine holes to receive credit.

Gymnastics Courses**PE 1290 Introduction to Gymnastics**

Fall and spring. Open to both male and female participants. Deals with a majority of the Olympic events. Focuses on beginner-level skills.

Ice Skating Courses**PE 1540 Introduction to Skating**

Fall and spring. For beginning to intermediate skaters. Fee charged; students provide skates or rent them at Lynah Rink. Covers forward and backward skating, turns, and stops.

PE 1545-1547 Figure Skating, Beginning, Intermediate, and Advanced Levels

Fall and spring. Fee charged; students provide skates or rent them at Lynah Rink. Instruction and practice in basic figure-skating techniques: forward, backward, crossovers, turns, and spirals.

Martial Arts—Self-Defense Courses**PE 1345-1346 Boxing, Introduction to, Intermediate**

Fall and spring. Fee charged. Covers the basic skills of footwork, defensive, and offensive techniques. Skipping rope, shadow boxing, and heavy bag work are taught as methods for individual aerobic conditioning.

PE 1350 Chi Gong

Fall and spring. Chi Gong, or "the art of breathing," is an ancient Taoist exercise system from China. Like Tai Chi, Chi Gong is an internal martial art that links movement, breathing, and visualization to enhance physical strength and mental clarity. In ancient times, this gentle system was used by warriors preparing for battle. They believed it would make their bodies impervious to weapons of the day. The movements used in Chi Gong are generally less complex than those of Tai Chi and can be learned more quickly. Meditation is an important element of the practice.

PE 1355 Judo, Introduction to

Fall and spring. Fee charged. Conditions and increases suppleness. Continues to develop skills in the two parts of judo: standing techniques (throws and trips) and mat techniques.

PE 1356 Judo, Intermediate

Fall and spring. Fee charged. Conditions and increases suppleness. Continues to develop skills in the two parts of judo: standing techniques (throws and trips) and mat techniques.

PE 1360 Jeet Kune Do/MMA

Fall and spring. Fee charged. Blended system of martial arts. Developed by the late Bruce Lee and taught to his personal apprentice at the time, Dan Inosanto, Jun Fan Gung Fu is the foundation from which Jeet Kune Do eventually evolved. The system emphasizes footwork and agility, economy of motion, counter ability, and strong practical self-defense. This realistic, modern training approach cultivates strong physical, mental, and emotional development in the student.

PE 1365 Karate, Introduction to

Fall and spring. Fee charged. Beginning course taught by professional black-belt instructors. Involves mastery of basic blocks, kicks, and punches.

PE 1366 Karate, Advanced

Fall and spring. Fee charged. Open to those who have taken basic karate or the equivalent.

PE 1370 Kung Fu

Fall and spring. Fee charged. Explores conditioning and fitness procedures used in the major martial arts, such as karate or judo. Covers circular movement for generating strong blocks, kicks, and punches.

PE 1375 Tae Kwon Do, Introduction to

Fall and spring. Fee charged. Korean martial art distinguished by emphasis on high and powerful kicks. Basic kicking, punching, and blocking emphasized.

PE 1376 Tae Kwon Do, Intermediate

Fall and spring. Fee charged. Korean martial art distinguished by its emphasis on high and powerful kicks. Intermediate-level kicking, punching, and blocking are emphasized.

PE 1380-1381 T'ai Chi Chuan, Introduction to, and Intermediate

Fall and spring. Fee charged. Introduction to T'ai Chi, a system of graceful exercises that aims at nurturing relaxation, deep breathing, and improved circulation.

PE 1385 Thai Boxing

Fall and spring. Fee charged. Martial art system developed from the unique culture of Thailand that is a blend of art, science, and sport.

PE 1390 Self-Defense and Empowerment for Women

Fall and spring. Fee charged. Basic methods of physical protection for women.

PE 1395 Self-Defense and Personal Safety in the Modern World

Fall and spring. Fee charged. Provides students an opportunity to learn a system of practical, proven self-defense techniques and educates the individual in the strategies of personal safety and awareness.

PE 1396 Filipino Kali

Fall and spring. Fee charged. A method of increasing your coordination and fitness, keeping both your mind and your body sharp! Kali/Escrima addresses empty hand and kicking, grappling, and tools of the jungle warrior.

PE 1525 Fencing, Classical

Fall and spring. Fee charged. Martial art that uses the practice of the sword to cultivate self-mastery.

PE 1526 Renaissance Fencing

Fall and spring. Prerequisite: Introduction to Fencing or permission of instructor. Fee charged.

Focuses on the fundamental techniques of 16th- to 17th-century fencing with an emphasis on safety, balance, line, focus, and distance.

PE 1527 Olympic Fencing

Fall and spring. Fee charged. Equipment furnished. Includes warm-up exercises and offensive and defensive moves.

PE 1528 Olympic Fencing II

Spring. Prerequisite: Olympic Fencing or equivalent. Fee charged. Equipment furnished.

Interclass competition is stressed.

PE 1529 Epee de Guerre

Fall and spring. Fee charged. This course focuses on "the most noble weapon" of the Ideal Knight: the "epee de guerre" ("sword of war") also sometimes

called the longsword, the bastard sword, or, most accurately, "the-hand-and-a-half sword" because the weapon was designed to be wielded with equal effectiveness either with one hand or two. Since the practice of the longsword is inextricably linked with the ideals and tenets of chivalry, this beginning level course may include philosophical discussion and reflection as well as techniques, tactics, and strategy.

Outdoor Education Program

For further information, class schedules, or to register at any time, call 255-6183 or visit www.coe.cornell.edu.

Climbing Courses**PE 1640 Basic Rock Climbing**

Fall, spring, and summer. Fee charged. Six or 10 indoor climbing sessions at the Lindseth Climbing Wall.

PE 1642 Women's Basic Rock Climbing

Fall, spring. Fee charged. Six indoor climbing sessions at the Lindseth Climbing Wall taught by and for women.

PE 1643 High Adventure

Fall, spring. Fee charged. Six sessions combining rappelling, rope traverses, tree climbing, and a 400-foot zipline.

PE 1644 Basic Outdoor Rock Climbing

Fall. Fee charged. Includes fall break trip. Two indoor classes and a four-day climbing trip to the Shawangunks introduce basic safety, techniques, equipment, and methods for outdoor rock climbing.

PE 1645 Basic Rock Climbing for 24 and Over

Fall. Fee charged. Noncredit course. Four indoor climbing sessions at the Lindseth Climbing Wall for people age 24 and older.

PE 1646 Wellness Rock Climbing

Fall. Fee charged. Noncredit course. Nine one-hour climbing sessions at the Lindseth Climbing Wall for Wellness Program members only.

PE 1650 Performance Rock Climbing

Fall, spring. Fee charged. Six indoor sessions at the Lindseth Climbing Wall that introduce and practice more advanced climbing techniques.

PE 1651 Introduction to Outdoor Rock Climbing

Fall, spring. Fee charged. One class and a weekend trip to the Shawangunks will introduce you to outdoor climbing and top rope anchor building.

PE 1652 Shawangunks Rock Climbing

Fall. Fee charged. Includes fall-break or senior-week trip. Two indoor classes and a four-day advanced climbing camp at the Shawangunks introduce advanced climbing techniques and systems for outdoor multi-pitch rock climbing.

PE 1653 Intro to Traditional Lead Climbing

Spring. Fee charged. Enjoy world-class rock climbing at one of the premier areas in the United States, the Shawangunks. We will travel to the 'Gunks for a three-day rock camp that will teach you the skills to do multi-pitch climbs.

PE 1654 Ice Climbing

Spring. Fee charged. Basic top-rope ice climbing instruction.

PE 1657 Tree Climbing

Fall, spring. Fee charged. All equipment is included in course fee. No experience necessary.

Whether you are a rain forest canopy researcher, an arborist, or just a kid at heart, everyone loves to climb trees. Recall the excitement and your sense of adventure when you first crawled into the branches to look inside a bird's nest. Then you swung from limb to limb without a thought of ropes and harnesses. But what about that big tree down the street you always wanted to climb, but couldn't reach the first branch? Cornell Outdoor Education's Tree Climbing course will teach you how to get up into the canopy of any tree, to move around, even to climb from one tree to another without touching the ground.

PE 1658 Costa Rica Tree Climbing

Fall with winter break trip. Fee charged. Spend ten days in Costa Rica, traveling to the Rio Guabo valley to explore the canopy of a lowland tropical rainforest. Learn how to use ropes and technical gear to get into the canopy of any tree, to move around, and to climb from one tree to another, 100 feet in the air, without coming back to the ground. Learn some local ecology and experience the culture of a Spanish-speaking rural community. A desire for experiencing a new culture is a must. All equipment is included in the course fee. No climbing experience necessary. Students must provide their own transportation to and from San Jose, Costa Rica.

Backpacking Courses**PE 1610 Backpacking in the Finger Lakes**

Fall, spring. Free with 100 percent attendance, otherwise fee charged. Escape from campus on day outings and weekend trips to explore the glens, forests, waterfalls, vistas, and trails in the local area. This fantastic introduction to backpacking skills covers basic outdoor living skills, including hiking, navigation, camping, equipment selection and use, back-country cooking, and safety. No experience necessary. Fee charged for personal rental equipment.

PE 1611 Backpacking in the Finger Lakes—Fall Break

Fall. Fee charged. Includes fall break trip. Travel to the heart of the Finger Lakes to learn and practice the skills of outdoor leadership and education. This is an introductory leadership course, focusing on wilderness skills, minimum impact travel, communication, judgement, and decision-making.

PE 1612 Southwest Backpacking

Spring. Fee charged. Includes spring break trip. Spend spring break exploring the wide open spaces of the Southwest. Destination changes year to year. Trip heads to either Utah's stunning and remote Escalante Canyon country or Arizona's Sonoran Desert wilderness of the Superstition Mountains. Visit www.coe.cornell.edu for trip destination and full details.

PE 1613 Wilderness Survival Skills

Fall. Fee charged.

Hands-on course covers principles of survival, shelter building, navigation, fire starting, and water procurement as well as nature observation skills and local natural history. Evening and weekend outings.

PE 1615 Trekking in Peru

TBA. Fee charged.

Come to Peru to hike through worlds highest mountains outside of Asia. Pristine high alpine lakes, spring wildflowers, and white glaciers dominate this rugged Andean landscape. The Santa Cruz Trek takes us 50 km beside turquoise glacial lakes and over high mountain passes.

PE 1616 Introduction to Winter Camping

Spring. Fee charged. Prerequisite: some backpacking experience; permission of instructor.

Learn the fundamentals of winter travel and camping. Course covers trip planning, equipment selection, snowshoe travel, snow shelter construction, and winter safety.

PE 1617 Surfing in San Diego

Spring. Fee charged.

Whether students are catching a wave or spotting dolphins, this class is sure to excite! Students will spend their nights overlooking the ocean from their cliffside campsite and their days catching a wave. Participants will learn the basics of how to surf, ocean safety, and basic outdoor living skills.

Biking Courses**PE 1664 Mountain Biking**

Fall, spring. Fee charged. Participants provide own mountain bike.

Explore local bike trails and develop off-road riding skills. Course covers essential cycling skills for riding single track, managing steep terrain, and negotiating obstacles, as well as bike repair, riding etiquette, navigation, and outdoor safety.

Canoeing Courses**PE 1670 Adirondack Canoe Camping**

Fall. Fee charged. Includes fall-break trip.

Learn basic canoeing and wilderness camping skills. Experience the blazing Adirondack autumn foliage as this fall-break trip explores lakes and rivers of upstate New York.

PE 1671 Recreational Canoeing

Fall. Fee charged.

Spend afternoons on Beebe Lake learning the art of canoeing. Class culminates in a trip exploring Dryden Lake applying your new-found skills. Course covers equipment, basic paddling techniques, deep water rescues, and considerations for day trips.

PE 1672 River Canoeing

Spring. No prerequisites. Fee charged.

Explore local rivers by canoe. Learn skills to safely navigate quick-moving currents and class I to easy class II water. Course covers strokes, braces, eddy turns, peel outs, ferrying, river dynamics, self-rescue, and river safety. Culminates with a weekend river trip.

Caving Courses**PE 1630 Caving**

Fall, spring. Fee charged.

Learn about the basic safety, techniques, and equipment for caving, finishing with a weekend caving trip.

Hiking Courses**PE 1602 Outdoors 101**

Spring. Fee charged.

From the gorges of Ithaca, to the lakes of Cornell, this course will give you a taste of it all. This multi-activity class is aimed at the beginner who would like a taste of many different outdoor pursuits. The class will provide an introduction to day hiking, indoor rock climbing, canoeing, and camping.

PE 1603 Snowshoeing and Winter Travel

Spring. Fee charged.

Outings in the local state forests build skills and confidence in the winter. Learn winter safety; snowshoe history; equipment selection, care, and use; navigation; and natural history—all while enjoying a great workout.

PE 1604 Snowshoeing and Winter Travel, for 24 and Over

Spring. Noncredit course. Fee charged.

Learn basic winter travel and snowshoe skills while exploring some local winter hiking destinations.

PE 1605 Day Hiking

Fall, spring. Fee charged.

Hike and explore Ithaca's spectacular gorges, state forests, and extensive trail system. Course covers planning and packing for a hike, dressing for the outdoors, map reading, outdoor safety, navigation, and natural history of the area.

PE 1606 Outdoor Birding Basics

Spring. Fee charged (fee waived upon successful completion of course and if needed for PE credit requirement).

Learn to identify and understand the behaviors of the birds in our area. This course is offered as a collaboration of COE and the Lab of Ornithology. Sibley's guide to Eastern Birds is included in the course fee, and optics will be available to use during each outing.

PE 1607 Back-Country Photography

Fall, spring. Fee charged. Includes fall break trip. Must have own camera.

Take your photography skills way beyond snapshots in "auto" mode? This fun introduction to camping and outdoor photography includes two pre-trip classes on the basics of photography. Spend Fall Break in the Adirondack wilderness, taking in the beautiful autumn colors. Plan to bring home images as awesome as the trip itself.

PE 1608 Trail Running

Fall, spring. Fee charged.

Covers stretching, basic trail-running techniques, navigation, injury prevention, training tips, and a scenic tour of local trails. Develop a training routine, learn to stay found, set running goals. Prerequisite: ability to jog two consecutive miles easily.

PE 1609 Trail Maintenance

Fall. Fee charged.

Widen your awareness and appreciation of our gorgeous local backcountry and its network of public trails. Come swing a pulaski and give something back as you learn and implement basic trail construction skills, as well as enjoy leisurely hikes. Possible projects include designing and creating a new trail; switchback construction; building bridges, waterbars and steps, erosion control, and clearing overgrown trails.

Kayaking Courses**PE 1674 Sea Kayak Touring**

Fall, spring. Fee charged.

Learn basic sea kayaking skills and enjoy a weekend trip to the Adirondacks. Course covers equipment, safety, paddling techniques, rescues, trip planning, navigation, considerations for overnight trips, and camping and travel skills.

PE 1680 Pool Paddling

Fall, spring. Free if taken for credit and successful completion of course; otherwise fee charged.

Learn a broad range of kayaking skills in the warm comfort and calm waters of the pool. Course introduces whitewater kayaks, canoes, and sea kayaks, while covering strokes, leans, braces, effective boat-handling skills, kayak Eskimo rolls, and rescues. Pool games, slalom gate courses, and video taping are used to hone an understanding of skills and refine techniques.

PE 1681 Whitewater Kayaking

Fall, spring. Prerequisite: ability to swim with comfort in deep water without a flotation aid. Fee charged.

Basic kayaking techniques and equipment use, culminating in a full weekend of whitewater paddling. Pool sessions and local outings develop skills to read water, scout, ferry, brace, power stroke, and execute eddy turns, peel outs, and Eskimo rolls.

PE 1682 Intermediate Whitewater Kayaking

Spring. Prerequisites: graduate of a COE whitewater kayak class or equivalent experience, comfortable swimming and self-rescuing in class II water and permission of instructor.

Designed for paddlers with some whitewater experience who are motivated to work on perfecting basic skills as well as developing more advanced techniques. Pool sessions to review the fundamentals. Learn more advanced paddling techniques and concepts, and develop skills by paddling increasingly challenging whitewater (up to class II+) during two day trips.

PE 1683 1,000 Islands Sea Kayaking

Fall. Fee charged. Includes fall break trip. International travel documentation to Canada required.

Learn fundamental sea kayak touring skills in the Thousand Islands region of the St. Lawrence River. Course covers equipment, safety, paddling techniques, rescues, trip planning, navigation, considerations for overnight trips, camping, cooking, and travel skills.

PE 1684 Cayuga Lake Dragon Boating

Fall. Fee charged.

Get in shape, stay in shape! Get out on the lake without buying your own boat. Paddle with twenty other people in a 40 foot wooden boat with a dragon head and tail! Romance, adventure, and fresh air!

PE 1685 Kayak Rolling Seminar

Fall, spring. Noncredit course. Fee charged. Learn kayak rolling techniques in two evening sessions. Classes take place at the Helen Newman pool.

PE 1686 Introduction to Sea Kayaking Seminar

Fall, spring. Fee charged. Noncredit course. Class covers equipment, basic paddling techniques, deep water rescues, and considerations for day trips.

Outdoor Leadership**PE 1619 Introduction to Outdoor Leadership**

Fall. Fee charged.

Take advantage of fall break in the Finger Lakes region to learn and practice the skills of outdoor leadership and education. This is an introductory leadership course, focusing on wilderness skills, minimum impact travel, judgement, and teaching beginners. Ideal for those who aspire to be Outdoor Odyssey Guides, COE instructors, as well as anyone interested in being better prepared to lead friends in the outdoors.

PE 1618 Outdoor Leadership

Spring. Prerequisite: backpacking and camping experience; approval of program coordinator. Fee charged. Includes spring break trip.

Learn and practice the skills of outdoor leadership and education. Focus is on refining wilderness skills, outdoor judgment, group facilitation, decision making, and teaching skills. Course culminates in spring-break trip where participants plan and lead portions of the trip.

Emergency Care Courses**PE 1625 Wilderness First Aid**

Fall, spring. Fee charged.

Full weekend of wilderness first aid. Includes CPR certification.

PE 1626 Wilderness First Responder

Fall, spring. Offered over winter break and late May/early June. Fee charged.

Eight days of instruction and practical application of backcountry first aid. Participants earn nationally recognized CPR and Wilderness First Responder certifications. Taught by Wilderness Medical Associates.

[PE 1627 WFR Recertification

Spring. Fee charged.

This three-day (24 hour) course is a recertification course open to graduates of ALL wilderness medical training courses of 64 hours or longer with a current certification. Upon successful completion of this course you will receive Wilderness Medical Associates WFR, Anaphylaxis and BLS-level CPR certifications.]

[PE 1627 CPR for the Professional Rescuer

Fall, spring. Not for credit.

This American Red Cross class teaches students to respond to breathing and cardiac emergencies in adults, children, and infants; use an AED on an adult or child victim of cardiac arrest; and use personal protective equipment to stop blood-borne pathogens and other diseases from spreading. It is the required level of CPR to keep WFR certification current. Includes ARC certification.]

[PE 1628 CPR Recertification

Spring. Not for credit.

The CPR Challenge Class is set up to re-certify at the Professional Rescuer level. Prerequisite is recent CPR training. There is no formal review at the beginning of the class; however, the instructor will answer questions for at least

the first half hour before beginning testing. The assumption is that students come prepared to take the challenge, so it is crucial to have taken a recent CPR class, to check out the textbook from COE, and to review it carefully before class. This class fulfills requirements to keep WFR certification current. Includes American Red Cross certification.]

Skiing Courses**PE 1690 Cross-Country Skiing**

Spring. Fee charged.

Four sessions learning basic cross-country skiing skills and exploring local forests in winter.

PE 1693 Basic Telemark Skiing

Spring. Fee charged.

Four classes at Greek Peak ski area.

PE 1694 Backcountry Telemark Skiing

Spring. Fee charged.

A cross between downhill and cross country skiing, telemark involves a graceful free-heel turn that opens up alpine and steep terrain to lightweight backcountry touring gear. We will ski together locally before shifting to our primary classroom in the mountains

Personal Growth Courses**PE 1400 Body-Mind**

Fall and spring.

Activities are drawn from ancient Eastern practices as well as modern Western psychology, and are designed to give the student first-hand experience of the interaction between their own bodies and minds.

PE 1401 Well-Being in the Modern World

Fall and spring. Fee charged.

Teaches students to use the wisdom of the body, movement, and voice. Each class provides an opportunity to increase mindfulness of the present moment. By cultivating openness and respect, students provide the necessary foundation for working with others. Students practice processing and exploring spontaneous experiences of their own and others with precision, gentleness, and curiosity.

PE 1402 Moving into the Moment

Fall and spring. Meets twice a week.

We will focus on getting in touch with the power of our own life force. Each class will begin with movement and stretching and end with a meditation exercise designed to reinforce the power of one's own presence.

PE 1403 Art of Living—Youth Empowerment Seminar

Fall. Fee charged.

An innovative and dynamic life-skills program that empowers you with tools to eliminate stress, increase energy, handle negative emotions, increase mental focus, heighten awareness, and develop strong social and leadership skills.

PE 1405 Living Routines

Fall and spring.

Provides the opportunity to explore a variety of ancient and modern methods designed to bring one to the state of meditation.

PE 1410 Introduction to Massage

Fall, spring, and summer. Fee charged.

Provides an experiential introduction to several types of massage. Included are Swedish, shiatsu, polarity, and sports massage. Class members participate in group exercises

and practice on each other during class time. All exercises and techniques can be done while wearing street clothing.

PE 1411 Shiatsu Massage

Fall and spring. Fee charged.

Gain an experimental understanding of your body and learn certain shiatsu massage techniques.

PE 1412 Swedish Massage

Fall, spring, and summer. Fee charged.

Learn to give a relaxing, stress-reducing Swedish massage. Students master the basic strokes of Swedish massage and learn about their application to the different parts of the body. Students use oils and lotions as a part of their training.

PE 1413 Swedish Massage II

Fall and spring. Fee charged.

Students build on skills learned in Swedish massage as they participate in instruction practice sessions every week. Additional massage techniques and applications are added to basic skills. Some techniques from other types of massage are also introduced.

PE 1414 Thai Massage

Fall and spring. Fee charged.

Thai massage is a holistic, intuitive style of healing from the East. It encourages the flow of energy through the receiver's body that promotes good health. The person giving Thai massage uses his or her hands and feet supported by body weight to apply pressure along the energy channels that run through the receiver's body.

PE 1415 Weekend Massage Workshop

Fall and spring. Fee charged.

This introductory course in massage is taught in an intensive, weekend workshop format. It includes sessions on Friday evening and Saturday and Sunday during the day. Students are introduced to massage skills and techniques and then practice on each other in a structured and supervised format. Basics of touch awareness, palpation skills, and techniques from Swedish and oriental (shiatsu) massage are taught. Students learn to massage the back, shoulders, neck, legs, feet, arms, and hands to reduce stress. Professional massage tables are used.

PE 1420 Introduction to Meditation

Fall and spring. Fee charged.

Provides the opportunity to explore a variety of ancient and modern methods designed to bring one to the state of meditation. The methods serve to evoke the deep relaxation from which heightened awareness and creativity arise.

PE 1421 Relaxation and Stress Management

Fall and spring.

Introduction to basic relaxation techniques for the reduction of everyday stress. Teaches techniques that can be used in normal everyday living situations.

PE 1422 Meditation and Relaxation

Fall and spring. Fee charged.

Designed to assist students in learning to meditate, or to deepen an existing practice. As students learn to practice meditation and relaxation exercises, they find that as little as 15 minutes a day can benefit physical, mental, emotional, and spiritual health.

PE 1425 The Winning Mindset

Fall and spring. Fee charged. Contains a wealth of knowledge and experience to guide athletes of all levels and abilities to achieve outstanding levels of performance. Students learn the principles to help them achieve success, whether it be tapping inner strength or overcoming the obstacles that limit performance.

PE 1430 Yoga, Introduction to

Fall, spring, and summer (six weeks). Fee charged. Fundamentals of hatha yoga. Covers basic postures, breathing techniques, and deep relaxation. Introduces chanting.

PE 1431 Intermediate Yoga

Fall and spring. Prerequisite: previous yoga experience. Fee charged. The course covers more of the fundamentals of Hatha Yoga, including basic postures, breathing techniques, and deep relaxation and chanting techniques.

PE 1432 Extreme Yoga

Fall and spring. Prerequisite: membership on a team, participation in daily routine, or minimum of 40 hrs. of yoga practice in past 3 months. Fee charged. This class is designed for serious participation only. Advanced warm-up sets, handstands, shoulderstands, spinal twists, and more. You will experience briskly paced transitions from one posture to the next emphasizing form and alignment with attention to the hamstrings to prevent injury.

Racquet Sports Courses**PE 1440 Badminton, Introduction to**

Fall and spring. Helen Newman Hall. Fundamental shots, scoring, and general play.

PE 1441 Badminton, Intermediate

Fall and spring. Helen Newman Hall. Review of fundamental shots, scoring, and general play.

PE 1445 Tennis, Introduction to

Fall, spring, and summer. Fee charged. Basic skills taught include forehand, backhand, serve, and volley. Scoring methods taught.

PE 1446 Tennis, Intermediate

Fall, spring, and summer. Fee charged. Review basic strokes plus topspin and underspin. Doubles strategy emphasized.

PE 1447 Tennis, Advanced

Fall, spring. Fee charged. Advanced strokes and doubles play emphasized. Recommended for tournament players or those with previous team experience.

PE 1453 Tennis, Indoor-Recreational

Fall and spring. Fee charged. Prerequisite: high school or college tournament experience or a rating of 3.5 or higher from USTA. NO BLACK-SOLED SHOES ALLOWED ON COURTS!

Play is conducted at the new Reis Tennis Center. Matches are played in both doubles and singles. Equipment furnished.

PE 1460 Racquetball, Introduction to

Fall, spring, and summer. Fee charged; equipment furnished. Protective eyewear required. Instruction for beginners.

PE 1465-1466 Squash, Introduction to, Intermediate

Fall, spring, and summer. Fee charged. Equipment furnished. Protective eyewear required. Classes for appropriate level of play.

Sailing Courses**PE 1335 Water Skiing**

Fall and summer. Fee charged. Introductory course for beginning water skiers. Classes are conducted from East Shore Marina.

PE 1480 Small-Boat Sailing, Introduction to

Fall, spring, and summer (six weeks). Fee charged. Learn basic skills necessary to sail small sailboats and basic keelboats safely.

PE 1481 Small-Boat Sailing, Competitive

Fall and spring. Fee includes one-year membership in university sailing team program. Vanguard 420 sailboat used for the course. USYRA Rules Book used as a text for the course.

PE 1482 Introduction to Large-Boat Sailing

Fall. Fee charged. Students learn how to sail on 24- and 26-foot sailboats. Skills learned include sailing terminology, safety and etiquette, boat handling, sail trimming, use of spinnakers, and heavy wind selection and ship systems.

PE 1483 Recreational Sailing

Fall. Fee charged. A course for those who already know how to sail. Students may go to the sailing facility during the listed times and days and take boats out to sail when they are not being used for instructional sailing. Students must pass knowledge test before they are allowed to take boats out.

PE 1484 Large-Boat Competitive Sailing

Fall. Fee charged. Prerequisite: sailing experience. This course teaches the basic skills necessary to sail and crew large boats safely and competitively. Twenty-three- to twenty-six-foot sailboats will be used to teach this course. The USYRU rules book will be the text for the course.

Skiing and Snow Boarding**PE 1330, 1331 Downhill Skiing and Snowboarding**

Spring. Fee charged. Transportation, instruction, ski-lift fees, and skiing time are offered in a package deal. Greek Peak and Song Mountain personnel are present at registration to explain the program and accept fees. Bus transportation to Greek Peak is provided six afternoons a week for six weeks.

Cross-Country Skiing—See Outdoor Program.

Target Shooting Courses**PE 1505 Trap and Skeet**

Fall, spring, and summer (six weeks). Fee charged. Guns and shells furnished. Includes lectures and shooting at the Tompkins County Rod and Gun Club range.

PE 1510 Riflery

Fall and spring. Fee charged. Instruction and practice in the techniques of target riflery from various shooting positions.

PE 1515 Handgun Safety, Introduction to

Fall, spring, and summer (six weeks). Fee charged. Instruction in use of pistol in the three modes of 50-foot competitive target shooting—slow fire, timed fire, and rapid fire. Emphasis on safety and responsibility while firing.

PE 1520 Archery, Introduction to

Fall and spring. Fee charged. Two classes a week. Instruction in the care of equipment; seven basic steps for shooting; scoring; practice shooting at 20, 30, and 40 yards.

Team Sports Courses**PE 1550 Ice Hockey, Introduction to**

Fall and spring. Prerequisite: basic skating ability. Fee charged. Students provide own skates and sticks; all other equipment furnished. Stick handling, passing, and shooting are stressed. Some scrimmaging.

PE 1551 Ice Hockey, Intermediate

Fall and spring. Fee charged. Prerequisite: beginning hockey or previous participation in organized hockey. This course is designed for the intermediate hockey player. Advanced techniques taught include positioning, power play, penalty killing, and offensive and defensive attack. Each session emphasizes game situations and scrimmaging. Skates and hockey sticks must be supplied by the participants.

PE 1560 Basketball

Fall and spring. Fundamental drills in passing, shooting, and dribbling. Scrimmages each class session.

PE 1565 Soccer

Fall and spring. Introduction to the game. Includes basic individual skills (passing, trapping, shooting) and team play and strategy.

PE 1570 Volleyball, Beginning/Intermediate

Fall and spring. Fundamentals of ball handling, serves, defensive blocks, and position play are stressed. Classes scrimmage.

PE 1571 Volleyball, Advanced

Fall and spring. Offensive and defensive team strategy is emphasized in class scrimmages.

PE 1575 Introduction to Competitive Rowing

Fall. This is an introduction to Division I rowing. Students with no prior rowing experience are accepted and encouraged. The class will involve significant physical activity and students are expected to be in good physical condition. Instruction on the basics of the rowing stroke, use of indoor tanks, ergometers, weight training, stretching, calisthenics and on-the-water work will be part of this class.

Weight Training Courses

PE 1580 Principles of Weight Training

Fall and spring. Fee charged.

Introduces the proper use of Olympic weights for improving physical condition and muscular strength. Instruction with focus on the relation between high-rep light weight lifting, low-rep heavy lifting, and the development of bulk, strength, and endurance.

PE 1581 Weight Training for Women

Fall and spring. Fee charged.

This class will focus on the basics of weight lifting. Topics will include toning vs. building, theory of program design, training with dumbbells, selectorized equipment, free weight exercises for all muscle groups, flexibility, and proper nutrition for weight training.

Independent Study

PE 1999 Independent Study

Fall and spring.

Designed for those who have difficulty fitting any of the regularly scheduled courses into their academic program. Class activities are based on personal fitness programs. A term paper is required. Permission to enter this program must be granted by the program director.

BIOLOGICAL SCIENCES

The biology major provides a unified curriculum for undergraduates enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. Courses in biological sciences are integral to many disciplines and are basic requirements in many schools and colleges at Cornell.

Graduate study in the biological sciences is administered by 30 specialized fields within the Graduate School, as described in the Fields of Study catalog at www.gradschool.cornell.edu/?p=38.

ORGANIZATION

Many different departments participate in the biology major.

Student services are provided by the Office of Undergraduate Biology (OUB), www.biology.cornell.edu. Located in Stimson Hall, the professional and student advisors provide academic and career advising, as well as help undergraduates find research opportunities on campus. Advisors in the OUB also follow the progress of biology majors and work closely with faculty advisors. Additional services and resources of the Biology Center include tutoring, examination files, and extensive information on summer research opportunities and graduate programs. The center has comfortable areas for studying and relaxing.

The Shoals Marine Laboratory, a cooperative venture with the University of New Hampshire, is located on Appledore Island in the Gulf of Maine. Its main administrative office in Stimson Hall provides academic advising for students interested in the marine sciences.

DISTRIBUTION REQUIREMENT

In the College of Agriculture and Life Sciences, the Physical and Life Sciences distribution requirement is a minimum of 18 credits, including at least 6 credits of introductory biology satisfied by BIOG 1109–1110, 1105–1106, or 1101 and 1103 plus 1102 and 1104, or 1107–1108.

For Students in the College of Arts and Sciences, most biology (“BIO”) courses can be used toward fulfillment of the biological sciences distribution requirement. Please see the Arts and Sciences “Distribution Requirements” section of this catalog for further details.

In the College of Human Ecology, the natural sciences distribution requirement is for at least 6 credits selected from BIOG 1109–1110, 1101 and 1103 plus 1102 and 1104, 1105–1106 or 1107–1108 or from specified courses in chemistry or physics.

Switching between BIOG 1109–1110 and either BIOG 1101–1104 or 1105–1106 at midyear may not be possible because of variation in presentation of topics. Students must receive permission of the instructor to

switch sequences. Taking sequences in reverse order is strongly discouraged in BIOG 1101–1104 but allowed in BIOG 1105–1106.

USE OF ANIMALS IN THE BIOLOGICAL SCIENCES CURRICULUM: CORNELL UNIVERSITY

Students wishing to enroll in biology (“BIO”) courses should know and understand the following criteria relative to the use of animals in the teaching program, as passed by the faculty of the Division of Biological Sciences in 1988 and reaffirmed in 1997:

1. “Live animals will be used for teaching in certain courses in the biological sciences. Some animals will require humane euthanasia after they have been used for teaching.
2. Courses bearing the “BIO” description conform to the rules for the care of such animals as outlined in *Guiding Principles in the Care and Use of Animals* (as approved by the Council of the American Physiological Society), the *Guide for the Care and Use of Laboratory Animals* (DHEW publication 86–23, revised 1996; see p. 7, *Courses of Study*), the Animal Welfare Act, and the New York State Public Health Law. Within these regulations, and in keeping with the principle of Academic Freedom of the Faculty, the use of animals to aid in teaching any biological sciences discipline is at the discretion of the professor in charge.
3. Each course, as well as research projects, in which animals are used receives a formal review annually by the Cornell University Institutional Animal Care and Use Committee (IACUC).
4. Any concerns regarding the use of live animals in teaching should be addressed first to the faculty member responsible for that course. He or she is required to be in compliance with all applicable regulations and guidelines. Alternatively, students may choose to address their concerns to the director of the Cornell Center for Research Animal Resources, Dr. Michele Bailey, at 253–3523. The director may initiate discussion with the faculty member responsible for a particular course without involving the student if he or she would prefer to remain anonymous.
5. Enrollees in those courses in the biological sciences in which animal use is a component may, at the professor's discretion, be asked to sign copies of this statement (USE OF ANIMALS . . .) at the first meeting of the course.”

ADVANCED PLACEMENT

For information on credit for advanced placement in biological sciences, see www.biology.cornell.edu/advising/ap.html.

THE MAJOR

The major of biological sciences is available to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. The undergraduate program is coordinated for students in both colleges by the Office of Undergraduate Biology. By completion of the sophomore year, all students who intend to major in biological sciences must declare the major and a program of study through the Office of Undergraduate Biology, in 216 Stimson Hall.

Whenever possible, students should include the introductory biology, chemistry, and mathematics sequences in their freshman schedule and complete the organic chemistry lecture course in their sophomore year. Biology majors should regularly monitor their progress in the major, and should assess as realistically as possible the likelihood of achieving at a level that is consistent with their academic and personal goals. Weak performance in core courses, particularly after the freshman year, may indicate a need to reevaluate aptitude and genuine interest in the major. Students with questions, particularly with concerns about their ability to complete the major, are encouraged to consult with their biology advisor and to take advantage of the professional advising services available in the Office of Undergraduate Biology as well as those of the university and their college.

The requirements for the biological sciences major are listed below. Requirements 1–9 must be taken for a letter grade. Students are required to complete all three biology core courses (biochemistry, evolution, and genetics) at Cornell or during an approved Study Abroad semester. Courses taken for the program of study should be taken for a letter grade unless the course is offered for S–U grades only or if the student's advisor grants permission.

1. **Introductory biology for majors** (one year): BIOG 1101 and 1103 plus 1102 and 1104, or 1105–1106. BIOG 1107–1108 or BIOSM 1110, offered during the eight-week Cornell summer session for 8 credits, also satisfies the introductory biology requirement for majors.
2. **General chemistry**: CHEM 2070–2080 or 2150. Students who, via advanced placement, take only CHEM 2080 or only 2150 should be aware that some professional and graduate schools require 8 credits of general chemistry. These students may wish to take both CHEM 2150 and 2080 or 2150 and 2160. Students may wish to consult with their faculty advisor or advisors in the Office of Undergraduate Biology for further clarification.

3. **College mathematics** (one year): one semester of calculus (MATH 1106, 1110, 1910, or their equivalent) plus one semester selected from the following:
 - a. a second semester of calculus (MATH 1120, 1920, or their equivalents).
 - b. a course in finite mathematics (MATH 1105).
 - c. a course in statistics (BTRY 3010, MATH 1710, AEM 2100, ILR 2100, PSYCH 3500, PAM 2100, ECON 3190, ECON 3210, SOC 3010).
4. **Organic chemistry:** CHEM 1570 and 2510, or 3570–3580 and 2510, or 3570–3580 and 3010, or 3590–3600 and 2510, or 3590–3600 and 3010.
5. **Physics:** PHYS 1101–1102, 2207–2208, or 1112–2213. Those who take PHYS 1112–2213 are advised to complete PHYS 2214 as well.
6. **Genetics:** BIOGD 2810.
7. **Biochemistry:** BIOBM 3300, or 3310 and 3320, or 3330.
8. **Evolutionary biology:** BIOEE 2780 or BIOPL 4480. Note: BIOPL 2410 Botany is a prerequisite course to BIOPL 4480.
9. **A program of study** selected from the outline below.

Although not required for the biological sciences major, a course in statistics is recommended for all biology students. Students should consult their faculty advisors when choosing appropriate courses in statistics.

Note: Core courses cannot count toward the program of study requirements.

Programs of Study and Requirements

As noted in the list of requirements above, students accepted into the biological sciences major must choose a program of study (POS). Whereas the core requirements of the biology curriculum provide the common foundation deemed essential for all biology majors, the role of the program of study is to provide either a concentration in a particular area of biology or, in the case of the general biology program of study, a survey of biology that is broad but not superficial. The program of study requirement can be met by taking 13 to 15 credit hours of courses chosen by the student in consultation with his or her biology advisor. Programs of study for particular subject areas are designed by faculty members specializing in the subject. Typically, the program of study consists of one or more courses that provide foundation in the subject and a list of optional courses from that area or related areas, many of which are at an advanced level (3000 or higher). Because biology is an experimental science, most programs of study require one or more laboratory courses. The laboratory requirement in some programs of study can be met by participation in the independent research course (BIOG 4990). The possible programs of study and their requirements are following:

1. **Animal Physiology:** BIOAP 3110 Introductory Animal Physiology, BIOAP 3160 Cellular Physiology, plus a minimum of 7 credit hours selected from the following lecture and laboratory courses,

of which at least 4 credit hours must be a laboratory course.

- a. Lecture courses: BEE 4540 Physiological Engineering; ANSC 3000 Animal Reproduction and Development; ANSC 4100 Nutritional Physiology and Metabolism; ANSC 4270 Fundamentals of Endocrinology; BIOG 3050 Basic Immunology; BIOAP 2140 Biological Basis of Sex Differences; BIOAP 4580 Mammalian Physiology; BIOAP 4750 Mechanisms Underlying Mammalian Developmental Defects; BIOAP 4890 Mammalian Embryology; BIOBM 4070 Nature of Sensing and Response: Signal Transduction in Biological Systems; BIOBM 4370 Eukaryotic Cell Proliferation; BIOBM 4834 Molecular Aspects of Development; BIOGD 3850 Developmental Biology; BIOGD 4000 A Genomics Approach to Studying Life; BIOGD 4010 Genomic Analysis; BIOGD 6100 Genomes as Chromosomes; BIOGD 6120 Overview of Model Genetic Organisms; BIONB 3220 Hormones and Behavior; BIONB 3260 The Visual System; BIONB 4920 Sensory Function; NS 3310 Physiological and Biochemical Bases of Human Nutrition.
 - b. Laboratory courses: BEE 4540 Physiological Engineering; ANSC 3010 Animal Reproduction and Development; BIOG 4010 Introduction to Scanning Microscopy; BIOG 4030 Transmission Electron Microscopy for Biologists; BIOAP 4130 Histology: The Biology of the Tissues; BIOAP 3190 Animal Physiology Laboratory; BIOAP 4160 Cellular Physiology and Genomics Laboratory; BIOBM 4400 Laboratory in Biochemistry and Molecular Biology; BIONB 4910 Principles of Neurophysiology.
2. **Biochemistry:** Students electing this program of study should be sure to complete CHEM 2070–2080 or CHEM 2150–2160 during their freshman year. BIOBM 4400 Laboratory in Biochemistry and Cell Biology; physical chemistry* (CHEM 2870–2880 or 3890–3900 or 3890–2880); 6 credits of organic chemistry (CHEM 3570–3580 or CHEM 3590–3600); BIOBM 4320 Survey of Cell Biology; and at least one other course with a biochemical or biophysical orientation selected from the following list: BIOBM 4380 RNA World; BIOBM 6310 Protein Structure, Dynamics, and Function; BIOBM 7300 Protein NMR Spectroscopy; CHEM 3000 Quantitative Chemistry; CHEM 4510 Structural Chemical Biology; CHEM 7380 Macromolecular Crystallography.
- Notes:**
- * Students interested in graduate work in biochemistry should take PHYS 2207–2208 and should consider taking CHEM 3890–3900 and its prerequisites.
 - Biology majors in the College of Agriculture and Life Sciences who select the biochemistry program of study are allowed to take up to 61 credit hours in the endowed colleges because of the high number of endowed courses required for this program.

3. **Computational Biology:** Computation has become essential to biological research. Genomic databases, protein databanks, MRI images of the human brain, and remote sensing data on landscapes contain unprecedented amounts of detailed information that is transforming almost all of biology.

Problems investigated by computational biologists include topics as diverse as the genetics of disease susceptibility; comparing entire genomes to reveal the evolutionary history of life; predicting the structure, motions, and interactions of proteins; designing new therapeutic drugs; modeling the complex signaling mechanisms within cells; predicting how ecosystems will respond to climate change; and designing recovery plans for endangered species. The computational biologist must have skills in mathematics, statistics, and the physical sciences as well as in biology. A key goal in training is to develop the ability to relate biological processes to computational models. Cornell faculty work primarily in four subareas of computational biology: biomolecular structure, bioinformatics and data mining, ecology and evolutionary biology, and statistical and computational methods for modeling biological systems. Specific topics of study include DNA databases, protein structure and function, computational neuroscience, biomechanics, population genetics, and management of natural and agricultural systems.

Beyond core skills in mathematics, physical sciences, and biology, the computational biology program of study requires additional course work in mathematics and computer programming, a “bridging” course aimed at connecting biology to computation, and an advanced course where the theoretical/computational component of one aspect of biology is studied. Students should enroll in the more rigorous courses in the physical and mathematical sciences and may wish to take additional courses in these areas.

Computational biology has applications as broad as biology itself. The problems of interest and the tools available to study them are constantly evolving, so students are encouraged to gain fundamental skills that will serve them throughout their careers. There is great, and increasing, demand for research scientists and technical personnel who can bring mathematical and computational skills to the study of biological problems. The program is also an excellent preparation for graduate study in any area of biology or computational biology.

Required Courses for Program of Study in Computational Biology

- a. One course in computer programming (CS 1110, CS 1112, CS 1113, CS 1114) Introduction to Computer Programming, or BEE 1510 Introduction to Computer Programming.
- b. One additional course in mathematics (MATH 2210 Linear Algebra; or MATH 2310 Linear Algebra with Applications; or MATH 2940 Linear Algebra for Engineers; or MATH 4200 Differential Equations and

- Dynamical Systems; or BTRY 4070 Principles of Probability and Statistics; or BTRY 4080 Theory of Probability; or BTRY 4210 Matrix Computation).
- c. One of the following bridging courses, i.e., a course in mathematical modeling applied to biology:
- BIOEE 3620 Dynamic Models in Biology
 - BIOEE 4600 Theoretical Ecology
 - BIONB 3300 Introduction to Computational Neuroscience
 - BTRY 4820 Statistical Genomics
 - BTRY 4830 Quantitative Genomics
 - BTRY 4840 Computational Genomics
 - CS 4520 Introduction to Bioinformatics
 - NTRES 3100 Applied Population Ecology
 - NTRES 4110 Quantitative Ecology and Management of Fisheries Resources
- d. One course from the following list of advanced courses, or an additional "bridging" course numbered 4000 or above:
- BIOBM 6310 Protein Structure and Function
 - BIOGD 4810 Population Genetics
 - BIOGD 4840 Molecular Evolution
 - BIOGD 4870 Human Genomics
 - BIONB 4220 Modeling Behavioral Evolution
 - BIOPL 4400 Phylogenetic Systematics
 - BTRY 4070 Principles of Probability and Statistics
 - BTRY 4080 Theory of Probability
 - BTRY 4090 Theory of Statistics
 - BTRY 4790 Probabilistic Graphical Models (also CS 4782)
 - BTRY 6520 Computationally Intensive Statistical Inference
 - CS 2110 Object-Oriented Programming and Data Structures
 - CS 4210 Numerical Analysis and Differential Equations
 - CS 4220 Numerical Analysis: Linear and Non-Linear Problems
 - CS 6522 Biological Sequence Analysis
 - MATH 4200 Differential Equations and Dynamical Systems
 - NTRES 4120 Wildlife Population Analysis: Techniques and Models
 - NTRES 6700 Spatial Statistics
 - ORIE 3500 Engineering Probability and Statistics II
 - ORIE 3510 Introductory Engineering Stochastic Processes

Notes:

1. It is strongly recommended that students in this POS use PHYS 2207/2208 to satisfy the core physics requirement.
2. It is strongly recommended that students complete the core organic chemistry requirement using the CHEM 1570/2510 option, and that the time saved be used to take either CS 2110 or a second mathematics course from the list above.

3. MATH 2210 Linear Algebra, MATH 2310 Linear Algebra with Applications, or MATH 4200 Differential Equations and Dynamical Systems is recommended for bridging course BIOEE 4600.
4. One course may not be used to satisfy two different requirements simultaneously. For example, BTRY 4080 can be used to satisfy either requirement (2) or requirement (4), but not both.
5. Students who use BTRY 4080 to fulfill the additional mathematics requirement should not use ORIE 3500 Engineering Probability and Statistics II to fulfill the requirement for an advanced course.
6. Biology majors in the College of Agriculture and Life Sciences who select this program of study are allowed to take up to 61 credit hours in the endowed colleges due to the high number of required endowed courses for this program of study.
4. **Ecology and Evolutionary Biology:** BIOEE 2610 Ecology and the Environment. Students must also complete 10 credits from the following lists: (a) Principles, (b) Organisms, and (c) Ecological and Evolutionary Processes. One course must be chosen from list (a) and a second either from list (b) or (c). The remaining credits can be satisfied with courses from all three lists. Students are encouraged to take at least one course from each list.
 - a. Principles: BIOEE 4530 Speciation; BIOEE 4580 Community Ecology; BIOEE 4600 Theoretical Ecology; BIOEE 4640 Macroevolution; BIOEE 4800/ENTOM 4700 Ecological Genetics; BIOEE 4780 Ecosystem Biology; NTRES 3100 Applied Population Ecology.
 - b. Organisms: BIOEE 2740 The Vertebrates: Structure, Function, and Evolution; BIOEE 3730 Biodiversity and Biology of the Marine Invertebrates or BIOSM 3760 Marine Invertebrate Zoology; BIOEE 4500 and 4501 Mammalogy, lec and lab; BIOEE 4700 and 4701 Herpetology lec and lab; BIOEE 4750 Ornithology; BIOEE 4760 Biology of Fishes; ENTOM 2120 Insect Biology; BIOPL 2410 Introductory Botany; BIOPL 4480 Plant Evolution and the Fossil Record; PLPA 3090 Fungi; BIOSM 4490 Marine Botany.
 - c. Ecological and Evolutionary Processes: BIOEE 2630 Field Ecology; BIOEE 2650 Tropical Field Ecology and Behavior; NS/ANTHR 2750 Human Biology and Evolution; BIOEE/BIONB/ENTOM 3690 Chemical Ecology; BIOEE/EAS 3500 Dynamics of Marine Ecosystems; BIOEE/MATH 3620 Dynamic Models in Biology; BIOEE 4460 Plant Behavior—Induced Plant Responses to Biotic Stresses; BIOEE/ENTOM 4550 Insect Ecology; BIOEE/NTRES 4560 Stream Ecology; BIOEE 4570 and 4571 Limnology: Ecology of Lakes, lec and lab; BIOEE/EAS 4620 Marine Ecology; BIOEE 4660 and 4661 Physiological Plant Ecology, lec and lab; BIOEE/HORT 4730 Ecology of Agricultural Systems; NTRES 4200 Forest Ecology; BIOSM 4130 Research

in Marine Biology; NTRES 4220 and 4221 Wetland Ecology and Management, lec and lab; BIOMI 4180 Microbial Ecology; CSS/HORT 4660 Soil Ecology; BIOPL/ENTOM 4400 Phylogenetic Systematics; BIOPL 4470 Molecular Systematics; BIOPL/ENTOM 4530 Principles and Practice of Historical Biogeography; BIOEE/EAS 4790 Paleobiology; BIOGD 4840 Molecular Evolution.

Note: Students also are encouraged to gain experience in some aspect of field biology through course work at a biological field station and can apply up to 6 credits in the place of courses from lists (b) or (c). For example, students may apply 6 credits from the following courses taken at the Shoals Marine Laboratory (BIOSM): BIOSM 3080 Field Microbial Ecology; BIOSM 3090 Coastal Ecology and Bioclimates; BIOSM 3210 Anatomy and Function of Marine Vertebrates; BIOSM 3740 Field Ornithology; BIOSM 3770 Diversity of Fishes; BIOSM 4770 Marine Vertebrates; and BIOSM courses in lists b and c. The Ecology and Evolutionary Biology program of study offers a specialization in Marine Biology and Oceanography (for a description, see "Courses in Marine Science"). The Organization for Tropical Studies (OTS) offers an Undergraduate Semester Abroad Program, featuring two courses (Fundamentals in Tropical Biology and Field Research in Tropical Biology) that can count as two 3-credit courses toward the concentration. Six credits can be applied from the 15-week fall "Semester in Environmental Science" program offered by the Woods Hole Marine Biological Laboratory.

5. **General Biology:** The program of study in general biology requires a minimum of 13 credit hours in addition to courses counted toward requirements 1–9 on pages 155–6. These 13 credits must include:
 - a. One course from each of three different programs of study in biology. Only those courses specifically listed as fulfilling a program of study requirement are acceptable without permission of advisor.
 - b. A course with a laboratory.
 - c. A minimum of two upper-level (3000 and above) courses of 2 or more credits each.

1000-level courses are not acceptable for meeting any of these requirements. BIOG 4980 may not be used to fulfill the requirements of this program of study. BIOG 4990 (minimum of 2 credits, but no more than 3 credits) may count as one of the upper-level courses and may count as the laboratory course with approval of the advisor, but it cannot count as a course representing a program of study. Students must use three or more biological sciences courses to fulfill the requirements of this program of study.

Note: It is possible to use a single course to fulfill more than one requirement. For example, BIOAP 4130 Histology could count in all three areas: as a course in the Animal Physiology program of study, as

an upper-level course, and as a course with a lab.

6. **Genetics and Development:** A minimum of 13 credits, usually chosen from the following courses: BIOGD 3850 Developmental Biology; any BIOGD course of 3000 level or higher; BIOMI 4200 Microbial Genomics; BIOAP 4750 Mechanisms Underlying Mammalian Developmental Defects; BIONB 4930 Developmental Neurobiology; BIONB 4950 Molecular and Genetic Approaches to Neuroscience; BIOBM 6330 Biosynthesis of Macromolecules; BIOBM 6390 The Nucleus; BIOEE 4530 Speciation; PLBR 4030 Genetic Improvement of Crop Plants; PLBR 6060 Advanced Plant Genetics; BIOPL 3430 Molecular Biology and Genetic Engineering of Plants; BIOPL 4821 Molecular Plant-Pathogen Interactions I; BIOPL 4822 Molecular Plant-Pathogen Interactions II; BIOPL 4823 Molecular Plant-Microbe Interactions; BIOPL 4824 Plant Gene Evolution and Phylogeny; BIOPL 4825 Molecular Biology of Plant Organelles; BIOPL 4826 Plant Biotechnology; BIOPL 4827 Plant Cell Walls: Structure to Proteome; BIOPL 4829 Light Signal Transduction in Plants; BIOPL 4831 Concepts and Techniques in Plant Molecular Biology; BIOPL 4832 Proteomics in Plant Biology; BIOPL 4833 Plant Genome Organization and Function; BIOPL 4834 Molecular Aspects of Plant Development; BIOPL 4835 Molecular Breeding; BIOPL 4836 Plant Senescence; BIOPL 6410 Laboratory in Plant Molecular Biology. Up to 3 credits for this program of study may be chosen from other biological sciences courses, including BIOGD 3990 Research Practicum in Molecular and Cellular Biology, or BIOG 4990 Independent Undergraduate Research in Biology, with approval from the faculty advisor.
7. **Insect Biology:** ENTOM 2120 Insect Biology plus a minimum of three additional courses totaling at least 9 credits selected from the following two groups. At least one of the three additional courses must be selected from group a.
- Group a:** ENTOM 3310 Insect Phylogeny and Evolution; ENTOM 3330 Larval Insect Biology; ENTOM 3520 Medical and Veterinary Entomology; ENTOM 4440 Integrated Pest Management; ENTOM 4550 Insect Ecology; ENTOM 4630 Invertebrate Pathology; ENTOM 4830 Insect Physiology
- Group b:** ENTOM 3150 Spider Biology; ENTOM 3250 Insect Behavior; ENTOM 3440 Insect Conservation Biology; ENTOM 3690 Chemical Ecology; ENTOM 3070 Pesticides, Environment, and Human Health; ENTOM 4530 Principles and Practice of Historical Biogeography; NTRES 4560 Stream Ecology; ENTOM 4700 Ecological Genetics; ENTOM 4770 Biological Control; ENTOM 4900 Insect Toxicology
8. **Microbiology:** The program of study in microbiology requires a minimum of 13 credit hours in addition to the biology requirements. The introductory lecture and lab course, BIOMI 2900 General Microbiology Lecture and BIOMI 2911 General Microbiology, Lab, ARE

REQUIRED. The remaining 8 credits must be completed by taking at least ONE of the courses from the list below, although more than one may be taken to reach the required credit level: BIOMI 3910 Advanced Microbiology Laboratory; BIOMI 4140 Prokaryotic Diversity; BIOMI 4160 Bacterial Physiology; BIOMI 4180 Microbial Ecology; BIOMI 4200 Microbial Genomics; BIOMI 4850 Bacterial Genetics. Other courses that can be used to fulfill the remaining credits are BIOMI 3940 Applied and Food Microbiology; BIOMI 4040 Pathogenic Bacteriology and Mycology; BIOMI 4090 Principles of Virology; BIOMI 4310 Medical Parasitology.

9. **Molecular and Cell Biology:** Students electing this program of study should be sure to complete CHEM 2070–2080 or CHEM 2150–2160 during their freshman year. CHEM 3570–3580 or 3590–3600; BIOBM 4320 Survey of Cell Biology; BIOBM 4400 Laboratory in Biochemistry and Molecular Biology, or BIONB 4300 Experimental Molecular Neurobiology; and at least 7 additional credits of courses that have a cell biological or molecular biological orientation. The 7 additional hours should include at least two 2-credit or above courses from the following list: any BIOBM course at the 4000 level or above; any BIOGD course at the 3000 level or above (**Note:** graduate-level BIOBM and BIOGD courses are acceptable with permission of your advisor); BIOMS 3150 Basic Immunology; BIOMI 4090 Principles of Virology; BIOMI 4200 Microbial Genomics; BIOMI 4850 Bacterial Genetics; BIONB 4250 Molecular Neurophysiology; BIONB 4950 Molecular and Genetic approaches to the Neurosciences; BIOPL 3420 Plant Physiology; BIOPL 3430 Molecular Biology and Genetic Engineering of Plants; BIOPL 4220 Plant Development; BIOPL 4440 Plant Cell Biology; BIOPL 4490 Green Signals and Triggers—The Plant Hormones; BIOPL 4620 Plant Biochemistry.
10. **Neurobiology and Behavior:** The two-semester introductory course sequence Neurobiology and Behavior I and II (BIONB 2210 and 2220) with discussion section (4 credits per semester) and 7 additional credits. The 7 additional credits must include at least one advanced course from the BIONB offerings. “Topics” courses (BIONB 4200s and 7200s), independent study (BIOG 4990), and PSYCH 4230 may be used as supplemental credits but **do not** qualify as advanced courses.
- Note:** Students who declare the program of study in Neurobiology and Behavior after taking BIONB 2210 or 2220 for only 3 credits must still take the 1-credit discussion section in BIONB 2210 and 2220. To arrange this, the student should consult the professors in charge of the two courses.
11. **Nutrition:** NS 3310 Physiological and Biochemical Bases of Human Nutrition (4 credits) and at least 9 credits of additional course work in the biological aspects of nutrition, such as NS 1220 Nutrition and the Life Cycle; NS 3150 Obesity and the Regulation of Body Weight; NS 3220

Maternal and Child Nutrition; NS 3320 Methods in Nutritional Sciences; NS 3410 Human Anatomy and Physiology; NS 3470 Human Growth and Development; NS 4210 Nutrition and Exercise; NS 4310 Mineral Nutrition and Chronic Disease; NS 4410 Nutrition and Disease; NS 4900 Manipulating the Mouse Genome; NS 6080 Epigenetics; NS 6100 Proteins and Amino Acids: Nutritional Regulation; NS 6110 Molecular Toxicology; NS 6140 Topics in Maternal and Child Nutrition; NS 6310 Micronutrients: Function, Homeostasis, and Assessment; and NS 6320 Regulation of Macronutrient Metabolism.

Note: For students in the College of Agriculture and Life Sciences, credits in NS courses count toward the required 55 CALS credits. For students in the College of Arts and Sciences, NS credits count toward the 100 hours required in A&S if those credits fulfill major requirements.

12. **Plant Biology:** Students choose one area of study from the following two options: Option (a) Botany: Students are required to take BIOPL 2410 Introductory Botany. Students should then choose, with the aid of their faculty advisor, a minimum of three of the following courses, for a total of at least 10 additional credits, to round out their botanical training: BIOPL 2420 and 2421 Plant Function and Growth, Lec and Lab; BIOPL 2430 Taxonomy of Cultivated Plants; BIOPL 2450 Plant Biology; BIOPL 2470 Ethnobiology; BIOPL 2480 Taxonomy of Vascular Plants; BIOPL 3420 and 3421 Plant Physiology, Lec and Lab; BIOPL 3430 and 3431 Molecular Biology and Genetic Engineering of Plants, Lec and Lab; BIOPL 3450 Plant Anatomy; BIOPL 3480 The Healing Forest; BIOPL 3590 Biology of Grasses; BIOPL 3800 Strategies and Methods in Drug Discovery; BIOPL 4040 Crop Evolution, Domestication, and Diversity; BIOPL 4220 Plant Development; BIOPL 4400 Phylogenetic Systematics; BIOPL 4420 Current Topics in Ethnobiology; BIOPL 4440 Plant Cell Biology; BIOPL 4470 Molecular Systematics; BIOPL 4480 Plant Evolution and the Fossil Record; BIOPL 4490 Green Signals and Triggers—The Plant Hormones; BIOPL 4520/4521 Systematics of Tropical Plants and Field Lab; BIOPL 4530 Principles and Practice of Historical Biogeography; BIOPL 4620 Plant Biochemistry; or BIOEE 4660 and 4661 Physiological Plant Ecology, Lec and Lab.
- Option (b) Plant Biotechnology: Students are required to take BIOPL 3430 and 3431 Molecular Biology and Genetic Engineering of Plants, Lec and Lab. Students choose, in consultation with their faculty advisor, a minimum of 10 additional credits from the following list: BIOEE 4460 Plant Behavior—Induced Plant Responses to Biotic Stresses; BIOPL 2410 Introductory Botany; BIOPL 2420 and 2421 Plant Function and Growth, Lec and Lab; BIOPL 3420 and 3421 Plant Physiology, Lec and Lab; BIOPL 3800 Strategies and Methods in Drug Discovery; BIOPL 4220 Plant Development; BIOPL 4440 Plant Cell Biology; BIOPL 4470 Molecular Systematics; BIOPL 4490 Green Signals and Triggers—The Plant Hormones; BIOPL 4620 Plant

- Biochemistry; courses in the 482x and 483x module series, as follows (note that BIOPL 4831 is a prerequisite for all other courses in this series); BIOPL 4821 Molecular Plant-Pathogen Interactions I; BIOPL 4822 Molecular Plant-Pathogen Interactions II; BIOPL 4823 Molecular Plant-Microbe Interactions; BIOPL 4824 Plant Gene Evolution and Phylogeny; BIOPL 4825 Molecular Biology of Plant Organelles; BIOPL 4826 Plant Biotechnology; BIOPL 4827 Plant Cell Walls: Structure to Proteome; BIOPL 4828 Plant Imaging; BIOPL 4829 Light Signal Transduction in Plants; BIOPL 4831 Concepts and Techniques in Plant Molecular Biology; BIOPL 4832 Proteomics in Plant Biology; BIOPL 4833 Plant Genome Organization and Function; BIOPL 4834 Molecular Aspects of Plant Development; BIOPL 4835 Molecular Breeding; BIOPL 4836 Plant Senescence; PLBR 4010 Plant Cell and Tissue Culture; PLBR 4020 Plant Tissue Culture Laboratory; PLBR 4030 Genetic Improvement of Crop Plants; PLBR 4070 Nutritional Quality Improvement of Food Crops; or PLPA 4190 Agricultural Application of Plant Disease Concepts.
13. **Systematics and Biotic Diversity:** A minimum of 13 credits from the following two groups, including at least 7 credits from group a and 3 from group b and at least two laboratory courses (marked with *). BIOG 4990 Independent Undergraduate Research in Biology, with approval of the advisor, can be used in fulfillment of up to 4 credits in group (a) and can count as one laboratory course if it has a laboratory component of 2 or more credits.
- a. *BIOEE 2640 Tropical Field Ornithology; *BIOEE 2740 The Vertebrates: Structure, Function, and Evolution; BIOEE 3710 Human Paleontology; *BIOEE 3730 Biology of the Marine Invertebrates; BIOEE 4050 Biology of the Neotropics; BIOEE 4500 Mammalogy, Lec; *BIOEE 4501 Mammalogy, Laboratory; BIOEE 4700 Herpetology, Lec; *BIOEE 4701 Herpetology, Lab; *BIOEE 4750 Ornithology; *BIOEE 4760 Biology of Fishes; BIOEE 4770 Marine Invertebrates Seminar; BIOMI 2900 General Microbiology, Lec; *BIOMI 2910 General Microbiology, Lab; *BIOMI 2911 General Microbiology Lab; BIOMI 3310 General Parasitology; BIOMI 4140 Prokaryotic Diversity, Lec; *BIOPL 2410 Introductory Botany; *BIOPL 2430 Taxonomy of Cultivated Plants; *BIOPL 2450 Plant Biology; BIOPL 2470 Ethnobiology; *BIOPL 2480 Taxonomy of Vascular Plants; BIOPL 3480 The Healing Forest; BIOPL 3590 Biology of Grasses; BIOPL 4520 Systematics of Tropical Plants; *BIOPL 4521 Systematics of Tropical Plants: Field Laboratory; *ENTOM 2120 Insect Biology; ENTOM 2150 Spider Biology: Life on a Silken Thread; ENTOM 3150 Spider Biology; ENTOM 3310 Insect Phylogeny and Evolution; *ENTOM 3311 Insect Phylogeny and Evolution Laboratory; *ENTOM 3330 Maggots, Grubs, and Cutworms: Larval Insect Biology; PLPA 3090 Fungi; *PLPA 3190 Mushrooms of Field and Forest.
- b. BIOEE 4530 Speciation; BIOEE 4640 Macroevolution; BIOEE 4790 Paleobiology; *BIOPL 4400 Phylogenetic Systematics; BIOPL 4470 Molecular Systematics; *BIOPL 4480 Plant Evolution and the Fossil Record; *BIOPL 4530 Principles and Practices of Historical Biogeography.

The Minor in Biological Sciences

The minor in biological sciences has been designed to provide students with a broad background in biology while allowing them some flexibility to choose courses of interest. Students must have completed one full year of introductory biology (or its equivalent) to declare the minor. Students will complete 12 to 15 credits by taking either all three biology core course requirements or two biology core course requirements and 5 or more biology credits from the lists of approved program of study courses found on pages 159–162 of this catalog.

Biology core courses

1. Biochemistry: BIOBM 3300, 3330, or 3310–3320; one year of general chemistry and organic chemistry lecture (CHEM 1570 or 3570–3580) are prerequisites
 2. Evolutionary biology: BIOEE 2780 or BIOPL 4480
 3. Genetics: BIOGD 2810
- *BIOG 4990 Independent Research may not be used to fulfill any requirement for the minor. No course substitutions are allowed. With the exception of transfer and study abroad students, no biology courses taken at other institutions will count toward the minor.

Notes:

- External transfer students must complete the core biology courses at Cornell. Students who are fulfilling the minor requirements under Option 2 must complete a minimum of one program of study course of at least 3 credits at Cornell.
- All courses for the minor must be taken for a letter grade unless a course is offered S–U only.
- Applications for the minor are located in 216 Stimson Hall and on the OUB web site. See Bonnie Comella, Jeff McCaffrey, or Wendy Aquadro for academic advising and for certifying completion of the minor.

Independent Research and Honors Program

Biology majors are encouraged to consider participating in individual research under the direction of a Cornell faculty member. Students interested in beginning research should contact faculty members who have compatible research interests. Information about faculty research interests and undergraduate research opportunities is available in the Office of Undergraduate Biology, 216 Stimson Hall, and at www.biology.cornell.edu.

Faculty members may consider the student's previous academic accomplishments, interests and career goals, and the availability of space and equipment when agreeing to supervise a student in their laboratory. Students conducting research for the first time must enroll in BIOG 2990, an S–U course designed to introduce students to research. After the

first semester, students enroll in BIOG 4990. Registration for both of these classes is done in the Office of Undergraduate Biology in 216 Stimson Hall. Students may work with faculty in any department on campus as long as the research topic is biological. Students may not earn credit for research done off campus, unless supervised by a Cornell faculty member. Up to 3 credits of research may be used to complete the programs of study in general biology, genetics and development, systematic and biotic diversity, as well as 4 credits in neurobiology and behavior.

The honors program in biological sciences is designed to offer advanced training in life science research through the performance of an original research project under the direct guidance of a member of the Cornell faculty. Biology majors planning on graduating with honors must apply to the Biology Honors Program in the spring of their junior year. Applications and information are available in the Office of Undergraduate Biology, 216 Stimson Hall, or at www.biology.cornell.edu/research/honors.html. To qualify for the program, students must have been accepted into the biological sciences major, have completed at least 30 credits at Cornell, and have a cumulative Cornell grade point average (GPA) of at least 3.0. In addition, students must have at least a 3.0 cumulative Cornell GPA in all biology, chemistry, mathematics, and physics courses. (Grades earned in courses in other departments that are used to fulfill biology major requirements are included in this computation.) In addition, candidates must find a Cornell faculty member to supervise their research. An honors candidate usually enrolls for credit in BIOG 4990 Undergraduate Research in Biology under the direction of the faculty member acting as honors supervisor, although the honors program does not require enrollment for credit. Students accepted into the honors program are required to participate in honors research seminars during their senior year; submit an acceptable honors thesis; complete all major requirements; and maintain a 3.0 Cornell cumulative and science GPA through graduation. Recommendation to the faculty that a candidate graduate with honors and at what level of honors is the responsibility of the Honors Program Committee. The student's final GPA and quality of his or her thesis are factors in determining the level of honors recommended.

Students interested in the honors program are strongly encouraged to begin their research projects in their junior year and to consider spending the following summer at Cornell engaged in full-time research on their honors project.

Biology majors who are considering study abroad and graduating with honors are encouraged to meet with their academic and research advisor during their sophomore year to carefully plan their academic schedule to meet the requirements of the honors program.

Application forms, requirements, deadline dates for the honors program and the Hughes Scholars Program, and information pertaining to faculty research may be obtained at the Office of Undergraduate Biology, 216 Stimson Hall, and at www.biology.cornell.edu.

CURRICULUM COMMITTEE

Many decisions pertaining to the curriculum and to the programs of study are made by the Biology Curriculum Committee, which meets monthly during the academic year. The committee consists of faculty and elected student members and welcomes advice and suggestions from all interested parties.

ADVISING

Students in need of academic advice are encouraged to consult their advisors or see an academic advisor in the Office of Undergraduate Biology, 216 Stimson Hall.

Students interested in marine biology should visit the Shoals Marine Laboratory Office, G14 Stimson Hall.

Students interested in the Biology and Society major should see pages 498–505 in the College of Arts and Sciences section of this catalog.

TRANSFERRING CREDIT

Biology majors are required to complete all three biology core courses (biochemistry, evolution, and genetics) at Cornell.

External transfer students are limited to transferring one core biology course and one course of up to 3 credits toward their program of study. See the Office of Undergraduate Biology for approval procedures.

Students who matriculated to Cornell as freshmen and Study Abroad students may transfer program of study courses at the discretion of their advisor. Study Abroad students must obtain approval from the Office of Undergraduate Biology, Director of Advising, to transfer biology core courses.

Online course credit is not acceptable to transfer for any biology course.

GENERAL COURSES (BIOG)

Three introductory biology course sequences are taught during the academic year: BIOG 1101–1104, 1105–1106, and 1109–1110; and two during the eight-week summer session: BIOG 1107–1108 and BIOSM 1110. BIOG 1101–1104, 1105–1106, 1107–1108, and BIOSM 1110 are intended for biological sciences majors and other students needing 8 credits from an introductory sequence for majors (e.g., students in a premedical curriculum). Any of these sequences meet the prerequisite for upper-level courses listing “one year of introductory biology for majors” as a prerequisite. BIOG 1109–1110 is a course sequence intended for nonmajors and meets the prerequisite for many, but not all, upper-level courses listing “one year of introductory biology” as a prerequisite. Students can earn a maximum of 8 credits in introductory biology (including advanced placement credits).

Other Introductory Biology Courses for Non-Biological Sciences Majors

The courses listed below are intended primarily for non-biological sciences majors.

Please see the full course description for more details.

BIOPL 1120 Issues in Social Biology: From Diet to Disease, DNA to Deforestation

BIOPL 2400 Green World/Blue Planet

BIOPL 2490 Hollywood Biology

BIOG 1109–1110 Biological Principles

CSS/BIOMI 1120 Microbes, the Earth, and Everything

Please see the CALS Registrar's Office web site for the most recent course additions.

BIOG 1101–1102 Biological Sciences, Lectures

1101, fall; 1102, spring. 2 credits each semester. Corequisite: BIOG 1103 (fall) or 1104 (spring). Prerequisite: for 1102, D or better in 1101 or permission of instructor. May not be taken for credit after BIOG 1105–1106 or 1109–1110. S–U or letter grades by permission of instructor. First lec of fall semester, F Aug. 28. No admittance after second week of classes. Evening prelims: fall, Sept. 24 and Nov. 3; spring, Feb. 25 and April 6. Fall, staff; spring, staff.

Designed for students who intend to specialize in biological sciences. The fall semester covers the chemical and cellular basis of life, energy transformations, physiology, neurobiology, and behavior. The spring semester covers genetics, development, evolution, and ecology. Each topic is considered in terms of modern evolutionary theory, and discussions of plant and animal systems are integrated.

BIOG 1103–1104 Biological Sciences, Laboratory

1103, fall; 1104, spring. 2 credits each semester. Corequisite: BIOG 1101 (fall) or 1102 (spring). Prerequisite: for 1104, D or better in 1103 or permission of instructor. Students registered for lab courses who are more than 10 minutes late for first meeting of lab forfeit registration in that course; no admittance after second week of classes. First lab of fall: week of Aug. 31; first lab of spring: week of Jan. 18. S–U or letter grades by permission of instructors. K.-C. Chen and L. L. Hester.

Designed to provide lab experience with major biological phenomena to support an understanding of the important concepts, principles, and theories of modern biology. A second objective is to help students gain expertise in the methods used by biologists to construct new knowledge. Students are exposed to basic concepts, research methods, including laboratory and data transformation techniques, and instrumentation in the major areas of biology. First-semester topics include biochemistry, physiology, plant biology, and scientific method and poster development. In the second semester, laboratory experience is provided in genetics, biotechnology, invertebrate diversity, plant and animal development, and ecology. During the first semester, students dissect a doubly pithed frog (pithing is done by the staff). Students dissect several invertebrates during the second semester. For those students who object to animal dissection, alternative materials are available for study. However, testing involves identification of important structures in real organisms.

BIOG 1105–1106 Introductory Biology

1105, fall; 1106, spring. 4 credits each semester; 2 credits by permission of instructor. Limited to 200 students. Taking 1105–1106 in sequence preferred but not required. May not be taken for credit after BIOG 1101–1104 or 1109–1110. No admittance after first week of classes. First lec of fall semester R Aug. 27, 9:05; additional study and lab. D. Campbell.

Designed primarily for biology majors, preprofessionals, and other students who desire a challenging, broad introduction to fundamental concepts of biology. Cell biology, physiology, anatomy, and biochemistry are strongly emphasized in BIOG 1105. BIOG 1106 covers genetics, development, ecology, evolution, behavior, and the diversity of organisms. Students who plan to concentrate in anatomy and physiology should consider taking this course because of the strong emphasis on organismal biology. Because some testing involves the use of pre-dissected specimens, students who object to dissections should take BIOG 1101–1104. The course uses an autotutorial format and offers considerable flexibility in scheduling. Completion of the course requires mastery of a group of core units. Testing on these units is primarily by oral examination. Students who elect to take the course must be able to meet deadlines. Four formal laboratory sessions are offered each semester; additional laboratory work is included in the core units. Evaluation is based on written reports on experimental work, practical exams, and a comprehensive final exam. Web site: www.biog1105-1106.org.

BIOG 1107–1108 General Biology

Summer, 8-week session; 1107, weeks 1–4; 1108, weeks 5–8. 4 credits each. 1107–1108 fulfills introductory biology requirement for majors and forms suitable introductory biology course sequence for students intending to go to medical school. Prerequisite: one year of college or permission of instructor; for BIOG 1108, grade of D or better in prerequisite courses (BIOG 1101, 1103, 1105, or 1107). Fee for weeks 1–4: \$25; for weeks 5–8, \$25. Staff.

Designed for students who plan further study in biology. 1107 covers biological metabolism, first at the molecular level and then progressively to the organ system level. The laboratory work involves an introduction to some major techniques, vertebrate dissection, and a survey of plant organization. 1108 seeks to integrate the topics of genetics, developmental biology, population biology, and ecology in a general consideration of biological evolution. The laboratory work is a continuation of the material covered in 1107 and involves more techniques, a survey of animal organization, and the design and performance of a field study. For those students who object to animal dissection, alternative materials are available for study. However, testing involves identification of important structures in real organisms.

BIOG 1109–1110 Biological Principles

1109, fall; 1110, spring. 3 credits each semester includes lecture and lab. Limited to 500 students. Nonmajors survey course, not appropriate for major in biological science or premed requirement. Both BIOG 1109 and 1110, taken in either order, are required to fulfill distribution requirement in CALS and Human Ecology. Either course fulfills Arts and Sciences

distribution requirement. Students with transfer credit must consult with course instructors for appropriate course placement. Due to overlap in content. Note: This course may not satisfy prerequisite for upper-level courses in biology. Letter grades only. Prelims: fall (2 in class); spring (2 in class). H. Greene, R. Wayne, E. Balko, and staff.

Both semesters of Biological Principles are intended to appeal to anyone who seeks an overview of general biology topics and current biological issues. BIOG 1109 is offered during fall semester and introduces students to the diversity of biological organisms, Mendelian genetics, behavior, and ecology and culminates by tying together the information covered during the semester with current issues involving global climate change and biomimetic research. BIOG 1110 integrates instruction about cells, organ systems, metabolic processes, reproduction, sexually transmitted infections, contraception, and bioengineering with the students' understanding of human biology. The culminating activities for spring semester includes hands-on activities involving some of the techniques used by health care professionals and forensic scientists, plus student-led debates about bioengineering. Laboratory sessions meeting alternate weeks (total of 6 labs per semester) are used for problem-solving experiments, demonstrations, discussions, and dissections (preserved vertebrate, invertebrate, and plant materials). For those students who object to dissection, alternative materials are available for study without grade penalty. Testing on dissection labs involves identification of important structures in real organisms. Registration for the lab section is required at the time of course registration. All students must enroll in lecture and lab using electronic course enrollment.

BIOG 1115 Biology Summer Bridge

Summer. 4 credits. Letter grades only.
R. Booker.

This is an inquiry-based course intended for prefreshmen who intend to major in life sciences or pursue a career in the health professions. Topics include the molecular and cellular basis of life, genetics, physiology, and natural selection. The course includes an intensive six-hour-per-week laboratory, writing and math workshops, and a study skills session. All students will be required to be part of the Biology Summer Bridge Living-Learning community.

BIOG 1200 Biology Scholars Program Freshman Seminar

Spring. 1 credit. Prerequisite: membership in Biology Scholars Program. S-U grades only. J. McCaffrey and J. J. Doyle.

This course is designed to help freshman biology majors make the transition to Cornell's science courses, give exposure to career options in research and medicine, provide opportunities to meet and network with faculty, and to facilitate students' pursuit of research on campus.

BIOG 1250 Biology Seminar

Fall and spring. 1 credit. Prerequisite: first-year standing or permission of instructor. S-U grades only. Staff.

A first-year seminar designed for students with Biology AP credit or a strong interest in research. Students will interact with faculty while learning to read and evaluate scientific publications on current biological topics. Multiple topics and sections will be offered each semester.

BIOG 2000 Special Studies in Biology

Fall, spring, or summer. 1-3 credits. Prerequisite: written permission from Office of Undergraduate Biology. Students must register in 216 Stimson Hall. S-U or letter grades by permission of instructor. Staff.

Registration device for students who want to take only a portion of a regular biological sciences course—for example, only the lectures or only the laboratory in a course that includes both. Only students who have already had training equivalent to the portion of the regular course that is to be omitted may register in this manner. This course may not be substituted for 1000-level courses and may not be used to fulfill college distribution requirements except by permission from the Office of Undergraduate Biology.

BIOG 2200 Biology Scholars Program Sophomore Seminar

Fall. 1 credit. Prerequisite: membership in Biology Scholars Program. S-U grades only. J. McCaffrey and J. J. Doyle.

The first half of the semester will focus on interpreting and evaluating scientific literature. Students will do group presentations on a primary research or review paper. The second half will cover careers in science, personal and professional development, on-campus research, and summer opportunities.

BIOG 2990 Introduction to Research Methods in Biology

Fall, spring, or summer. Variable credit; max. 3 suggested. S-U grades only. Recommended for freshmen and sophomores. Students must register for credit in Office of Undergraduate Biology, 216 Stimson Hall. Applications available in OUB and at www.bio.cornell.edu. **Add deadline is three days before university deadline.** Any Cornell faculty member whose research field is biological in nature may serve as a supervisor for this course. Non-Cornell supervisors not acceptable.

Intended for students who are new to undergraduate research. Students enrolled in BIOG 2990 may be reading scientific literature, learning research techniques, or assisting with ongoing research. The faculty supervisor determines the work goals and the form of the final report.

BIOG 4000 Undergraduate Seminar in Biology

Fall or spring. Variable credit; 1-3 assigned for individual seminar offerings; participation in Weill Cornell Medical College in Qatar required. S-U or letter grades. Staff.

Specialized seminars on topics of interest to undergraduates studying at Weill Cornell Medical College in Qatar.

BIOG 4040 Planning for Graduate Study in Biology

Fall. 1 credit. S-U grades only. L. Southard. For students who plan to pursue a graduate degree leading to a research career. Selected topics include information on academic and industrial research careers, selecting appropriate graduate programs, and options for funding. Features faculty, graduate student, and outside speakers. Students write and receive feedback on personal statements.

BIOG 4080 Presentation Skills for Biologists

Spring. 1 credit. Prerequisite: research experience. Priority given to students accepted into Biology Honors Program.

S-U grades only. L. Southard and G. Hess. Covers oral and written communication skills used in presenting research to other scientists. Topics include organization and writing of scientific papers, presentation tips for research seminars, and preparation of visual aids using Microsoft PowerPoint. All students present a 10-minute seminar on their research and evaluate other presentations.

BIOG 4100 Teaching High School Biology

Fall. 3 credits. Prerequisite: one year introductory biology; permission of instructor. S-U or letter grades. Offered alternate years. L. Southard.

Gives students the opportunity to experience teaching high school science. Students select an important biological concept, then develop inquiry-based teaching plans appropriate for high school students. The first part of the course consists of lectures, discussion, and laboratory experiments, which familiarize the students with the scientific content. Students then work in teams with high school teachers to develop their curriculum. The final part of the course includes practice presentations and teaching at regional high schools.

BIOG 4940 Special Topics in Biological Sciences

Fall or spring. 1-4 credits, variable. S-U or letter grades.

Biological Sciences offers "trial" courses or seminars under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under this number will be approved by the Biological Sciences Curriculum Committee, and the same course is not to be offered more than twice under this number.

BIOG 4980 Teaching Experience

Fall or spring. 1-4 credits. Limited enrollment. Prerequisite: previous enrollment in course to be taught or equivalent. Note: Arts students may not count this course toward graduation but may, upon petition (one time only) to their class dean, carry fewer than 12 *other* credits and remain in good standing. This would affect Dean's List eligibility but not eligibility for graduating with distinction. S-U or letter grades by permission of instructor. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring.

BIOG 4990 Independent Undergraduate Research in Biology

Fall, spring, or summer. Variable credit. S-U or letter grades. Note: Arts students may not register for more than 6 credits per semester with one supervisor or 8 credits per semester with more than one supervisor. Students in CALS may use up to 15 credits of independent study (BIOG 4990, 4980) toward graduation. Up to 3 credits of research may be used to complete programs of study in General Biology, Genetics and Development, and Systematics and Biotic Diversity, and 4 credits of research in Neurobiology and Behavior. Prerequisite: one semester of

BIOG 2990 or equivalent or permission of instructor and Office of Undergraduate Biology.

For students with previous undergraduate experience conducting biological research at Cornell. Students enrolled for this credit should be doing independent work on their own project. Registration forms are available in OUB and on the web at www.bio.cornell.edu. **Add deadline is three days before university deadline.** Each student must submit proposed research project description during course registration. Any Cornell faculty member whose research field is biological in nature may serve as supervisor for this course. Non-Cornell supervisors not acceptable.

BIOG 6000 Graduate Seminar in Biology

Fall or spring. Variable credit (1–3 credits assigned for individual seminar offerings); may be repeated for credit. S–U or letter grades. Staff.

Specialized seminars on topics of interest to graduate students presented by biology faculty including visiting faculty.

ANIMAL PHYSIOLOGY (BIOAP)

BIOAP 1250 Biology Seminar

Fall and spring. 1 credit. Prerequisite: first-year standing or permission of instructor. S–U grades only. Staff.

A first-year seminar designed for students with Biology AP credit or a strong interest in research. Students will interact with faculty while learning to read and evaluate scientific publications on current biological topics. Multiple topics and sections will be offered each semester.

[BIOAP 2140 The Biological Basis of Sex Differences (also BSOC 2141, BIOMS/FGSS 2140)]

Fall. 3 credits. Prerequisite: one year introductory biology. S–U or letter grades. Offered alternate years; next offered 2010–2011. J. E. Fortune.

Examines the structural and functional differences between the sexes. Emphasizes mechanisms of mammalian reproduction; where possible, special attention is given to studies of humans. Current evidence on the effects of gender on nonreproductive aspects of life (behavior, mental, and physical capabilities) is discussed. This course is intended to provide students with a basic knowledge of reproductive endocrinology and with a basis for objective evaluation of sex differences in relation to contemporary life.]

BIOAP 3110 Introductory Animal Physiology (also BIOMS 3110, VTBMS 3460)

Fall. 3 credits. Prerequisites: one year college biology, chemistry, and mathematics. Recommended: previous or concurrent physics course. S–U or letter grades by permission of instructor. Evening prelims. E. R. Loew.

General course in animal physiology emphasizing principles of operation, regulation, and integration common to a broad range of living systems from the cellular to the organismal level. Structure/function relationships are stressed along with underlying physico-chemical mechanisms.

BIOAP 3160 Cellular Physiology (also BIOMS 3160)

Spring. 3 credits. Pre- or corequisite: BIOBM 3300 or 3310 and 3320 or 3330. Letter grades only. Evening prelims. A. Quaroni.

A comprehensive course covering the general characteristics of eukaryotic cells; the structure, composition, and function of subcellular organelles; and the major signal transduction pathways regulating a variety of physiological cell activities. Among the main subjects covered are absorption and transport processes, mechanism of action of signaling molecules (hormones), the cell cycle and regulation of cell proliferation, cell-cell communication, extracellular matrix, and carcinogenesis.

BIOAP 3190 Animal Physiology Experimentation (also BIOMS 3190)

Fall. 4 credits. Prerequisite: BIOAP 3110 or permission of instructor. For pre-med, pre-vet juniors and seniors and graduate students interested in biomedical science. Letter grades only. E. R. Loew, N. A. Lorr, and staff.

Student-conducted in vitro and in vivo experiments designed to illustrate basic physiological processes, physiological research techniques, instrumentation, experimental design, and interpretation of results. Techniques include anesthesia, surgical procedures, dissection, and real-time computer recording and analysis. Experiments with isolated living tissues or live anesthetized animals examine properties of membranes and epithelia, blood, nerves, skeletal and smooth muscle; cardiovascular, respiratory, renal, and reproductive function and their regulation by the nervous and endocrine systems.

BIOAP 4130 Histology: The Biology of the Tissues (also BIOMS 4130)

Spring. 4 credits. Prerequisite: one year introductory biology. Recommended: BIOBM 3300 or 3310, or equivalent. S–U or letter grades. S. Suarez and L. Mizer.

Provides students with a basis for understanding the microscopic, fine-structural, and functional organization of vertebrates (primarily mammals), as well as methods of analytic morphology at the cell and tissue levels. Emphasizes dynamic interrelations of structure, composition, and function in cells and tissues.

BIOAP 4160 Cell Physiology and Genomics Laboratory (also BIOMS 4160)

Spring. 4 credits. Limited to 24 students. Pre- or corequisite: BIOAP 3160 or BIOBM 4320 or permission of instructor. For pre-med, pre-vet, juniors, seniors, and graduate students interested in biomedical science. Letter grades only. H.–H. Chuang, N. A. Lorr, and staff.

The course emphasizes the application of molecular biology and analytical methods, including microscopy, to investigation of physiological mechanisms of cellular excitability. Students learn manipulation of nucleic acids including molecular cloning RT-PCR, qRT-PCR and microarray analysis, heterologous expression systems including *Xenopus* oocytes and cultured mammalian cells, characterization of proteins using antibodies, and analysis of ion channels, receptors, and signal transduction pathways by measuring ionic currents and membrane potentials in the *Xenopus* oocyte expression system. Students also learn critical reading of original research articles. Students will conduct an independent project in the latter part of the

semester using methods and systems introduced during the course.

BIOAP 4250 Gamete Physiology and Fertilization (also ANSC 4250)

Fall. 2 credits. Prerequisite: ANSC 2400 or equivalent. Letter grades only. Offered alternate years. Lec. J. E. Parks. For description, see ANSC 4250.

BIOAP 4270 Fundamentals of Endocrinology (also ANSC 4270)

Fall. 3 credits. Prerequisite: animal or human physiology course or permission of instructor. Letter grades only. Lec. P. A. Johnson.

For description, see ANSC 4270.

BIOAP 4580 Mammalian Physiology (also BIOMS 4580)

Spring. 3 credits. Auditors allowed. Prerequisite: BIOAP 3110 or equivalent. Recommended for biological sciences majors, pre-med and pre-vet students, and beginning graduate students in physiology, nutrition, and animal science. Letter grades only. Evening prelims. K. W. Beyenbach.

The course offers a treatment of selected topics in vertebrate and human physiology that emphasizes concepts and a working knowledge of physiology. The first course half surveys biological design and the functional strategies of multicellular animals. Topics include mammalian fluid compartments, homeostasis, and membrane and epithelial transport. The second half examines the mechanism and the regulation of cardiovascular, gastrointestinal, and renal systems. Course-concluding lectures aim to illustrate the integration of systems in the regulation of acid/base balance. Clinical examples of dysfunction will underscore the role of normal function, and some diseases will be traced to the deepest roots of their molecular etiology. Weekly problem sets count 50 percent of the final grade.

BIOAP 4750 Mechanisms Underlying Mammalian Developmental Defects (also BIOMS/NS 4750)

Spring. 3 credits. Prerequisites: BIOBM 3300, 3310–3320, or 3330 (may be taken concurrently). S–U or letter grades. Offered alternate years. D. Noden and P. Stover.

Focuses on the causes of developmental defects and how genetic changes or teratogenic insults disrupt developmental regulatory and metabolic pathways.

BIOAP 4890 Mammalian Embryology (also BIOGD/BIOMS 4890)

Spring. 3 credits. Prerequisite: introductory biology. S–U or letter grades. Evening prelims. Offered alternate years. D. M. Noden.

Examines the early formation of the mammalian body and placenta, emphasizing comparative aspects, and morphogenesis and histogenesis of each organ system.

BIOAP 4980 Teaching Experience

Fall or spring. 1–4 credits. Limited enrollment. Prerequisites: previous enrollment in course to be taught or equivalent. Note: Arts students may not count this course toward graduation but may, upon petition (one time only) to their class dean, carry fewer than 12 other credits and remain in good standing. This would affect Dean's List eligibility but not eligibility for graduating with distinction. S–U or letter grades by permission of instructor. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring.

[BIOAP 7140 Cardiac Electrophysiology

Fall. 1 credit. S-U grades only. Offered alternate years; next offered 2010-2011.

R. Gilmour.

Survey of cardiac potentials, passive membrane properties, ion channels, and cardiac arrhythmias. Emphasizes nonlinear dynamic aspects of cardiac electrophysiology and cardiac arrhythmias.]

BIOAP 7200 Animal Physiology and Anatomy Seminar

Fall and spring. 1 credit each semester; may be repeated for credit. Prerequisite: admission to graduate field of physiology. S-U or letter grades. R. Davison.

Designed to train graduate students in the field of physiology to become professional scientists. Students are required to give a seminar on their research. Advice and feedback are provided. Throughout the semester, advice is provided on subjects such as preparation of manuscripts, seminars, and grant proposals.

BIOAP 7570 Current Concepts in Reproductive Biology

Fall. 3 credits. Limited to 20 students.

Prerequisites: undergraduate degree in biology and strong interest in reproductive biology. S-U or letter grades. Offered alternate years. J. E. Fortune, P. A. Johnson, and staff.

Team-taught survey course in reproductive physiology/endocrinology. Lectures by a number of reproductive biologists on various aspects of male reproductive function (endocrine regulation, testis function, spermatogenesis, sperm physiology/function); female reproductive function (endocrinology, ovarian development and function, oocyte physiology/function); fertilization and gamete transport; pregnancy; parturition; lactation; aging; reproductive technology. Student participation in the form of discussions and/or presentations.

BIOAP 7940 Special Topics in Physiology

Fall or spring. 1 or 2 credits per topic; may be repeated for credit. Enrollment in each topic may be limited. S-U or letter grades by permission of instructor. Staff.

Lectures, laboratories, discussions, and seminars on specialized topics.

Related Courses in Other Departments

Advanced Work in Animal Parasitology (VETMI 7370)

Animal Reproduction and Development (ANSC 2400)

Developmental Biology (BIOGD 3850)

Fundamentals of Endocrinology (ANSC 4270)

Research in Marine Biology (BIOSM 4130)

Sensory Function (BIONB 4920)

Teaching Experience (BIOG 4980)

Undergraduate Research in Biology (BIOG 4990)

BIOCHEMISTRY, MOLECULAR AND CELL BIOLOGY (BIOBM)

BIOBM 1250 Biology Seminar

Fall and spring. 1 credit. Prerequisite: first-year standing or permission of instructor. S-U grades only. Staff.

A first-year seminar designed for students with biology AP credit or a strong interest in research. Students will interact with faculty while learning to read and evaluate scientific publications on current biological topics. Multiple topics and sections will be offered each semester.

BIOBM 1320 Orientation Lectures in Molecular Biology and Genetics (also BIOGD 1320)

Spring, weeks 1-3. 0 credits. Primarily for freshmen, sophomores, and transfer students. S-U grades only. J. Blankenship.

Six professors discuss their research and promising new areas for research in the future.

BIOBM 3300-3320 Principles of Biochemistry

Introductory biochemistry is offered in three formats: individualized instruction (3300) and lectures (3310 and 3320) during the academic year, and lectures (3330) during the summer. *Lectures are given fall semester (3310), spring semester (3320), and summer (3330).*

BIOBM 3300 Principles of Biochemistry, Individualized Instruction

Fall or spring. 4 credits. Prerequisites: one year introductory biology and one year general chemistry and CHEM 1570 or 3570-3580 (CHEM 3580 may be taken concurrently) or equivalent, or permission of instructor. Recommended: concurrent registration in BIOBM 3340. May not be taken for credit after BIOBM 3310, 3320, or 3330. S-U or letter grades. Evening prelims: fall, Oct. 1 and Nov. 3; spring, Feb. 25 and April 6. J. E. Blankenship, P. C. Hinkle, and staff.

Fourteen units that cover protein structure and function, enzymes, basic metabolic pathways, DNA, RNA, protein synthesis, and an introduction to gene cloning. No formal lectures, autotutorial format.

BIOBM 3310 Principles of Biochemistry: Proteins and Metabolism

Fall. 3 credits. Prerequisites: one year introductory biology, one year general chemistry, and CHEM 1570 or 3570-3580 (CHEM 1570 or 3570 should not be taken concurrently) or equivalent, or permission of instructor. May not be taken for credit after BIOBM 3300 or 3330. S-U grades by permission of instructor. Lec; evening prelim Oct. 22. G. W. Feigenson.

The chemical reactions important to biology, and the enzymes that catalyze these reactions, are discussed in an integrated lecture format. Topics include protein folding, enzyme catalysis, bioenergetics, and key reactions of synthesis and catabolism.

BIOBM 3320 Principles of Biochemistry: Molecular Biology

Spring. 2 credits. Prerequisites: one year introductory biology and previous or concurrent registration in organic chemistry, or permission of instructor. May not be taken for credit after BIOBM 3300 or 3330. S-U or letter grades by permission of instructor. Lec. B. K. Tye.

Comprehensive course in molecular biology that covers the structure and properties of

DNA, DNA replication and repair, synthesis and processing of RNA and proteins, the regulation of gene expression, and the principles and applications of recombinant DNA technologies, genomics, and proteomics.

BIOBM 3330 Principles of Biochemistry: Proteins, Metabolism, and Molecular Biology

Summer, eight-week session. 4 credits.

Prerequisites: one year introductory biology, one year general chemistry, and CHEM 1570, or 3570-3580, or equivalents, or permission of instructor. May not be taken for credit after BIOBM 3300, 3310, or 3320. H. Nivison.

Topics include the structure and function of proteins, enzyme catalysis, metabolism, and the replication and expression of genes.

BIOBM 3340 Computer Graphics and Molecular Biology

Fall or spring. 1 credit. Prerequisite:

BIOBM 3330 or 3310-3320 (BIOBM 3320 may be taken concurrently) or Corequisite:

BIOBM 3300. J. E. Blankenship, P. C. Hinkle, and staff.

Visualization of complex biomolecules using Silicon Graphics computers. Group presentations on current topics in molecular biology.

BIOBM 3990 Research Practicum in Molecular and Cellular Biology

Fall or spring. 4 credits. Limited to 12 students.

Prerequisites: genetics (BIOGD 2810) or biochemistry (BIOBM 3300 or BIOBM 3310 or BIOBM 3320 or BIOBM 3330) and permission of instructor. Lec.

Letter grades. Taught occasionally; check with Dept. of MBG for scheduling. Staff.

Organizational meeting to schedule open lab times on first day of class. A laboratory course that integrates ongoing faculty research to introduce students to a project-based research environment. Students will engage in the practice of doing science by direct participation in current projects using a variety of experimental methodologies from molecular and cellular biology, biochemistry, genetics, genomics, and computational biology. Students will work in collaborative research groups to approach and solve scientific problems through rigorous inquiry and exchange. Credit may be awarded to a maximum of two consecutive semesters.

BIOBM 4310 Frontiers in Biophysics

Fall, full day of lec, S, Sept. 12, 9 a.m.-4 p.m., Racker Room, Biotechnology Bldg. 0.5 credit. S-U grades only. G. Feigenson and staff.

Overview of current research in biophysics at Cornell by faculty from different departments across the university. Designed for undergraduates considering a career in biophysics and for graduate students interested in biophysics research opportunities at Cornell.

BIOBM 4320 Survey of Cell Biology

Spring. 3 credits. Prerequisite: BIOBM 3300, 3330, or 3310, and previous or concurrent registration in 3320, or equivalent. Recommended: BIOGD 2810.

Lec. Undergraduate students must enroll in this course for letter grade; graduate students may enroll either for letter grade or S-U. Evening prelims Mar. 9 and Apr. 22. V. M. Vogt.

Survey of a wide array of topics focusing on the general properties of eukaryotic cells. Topics include methods used for studying cells, the structure and function of the major

cellular organelles, and analyses of cellular processes such as mitosis, endocytosis, cell motility, secretion, cell-to-cell communication, gene expression, and oncogenesis. Some of the material is covered in greater depth in BIOBM 4370, BIOGD 4830, BIOBM 6360, and 6390.

BIOBM 4340 Applications of Molecular Biology to Medicine, Agriculture, and Industry

Fall. 3 credits. Prerequisites: BIOBM 3300 or 3330 or 3310/3320. Recommended: BIOBM 4320. Letter grades. Lec. S. Ely. Lecture topics emphasize transgenic animal and plant systems that constitute marketed or near-market applications such as production of pharmaceuticals in milk, edible and nucleic acid vaccines, gene therapy, and high-tech agricultural products. Additional topics may include cancer treatments and relevant aspects of the human genome projects. An overview of human immunology and its relationship to drug development will be provided. Students will also explore relevant scientific literature.

BIOBM 4350 Undergraduate Biochemistry Seminar

1 credit; may be repeated. Prerequisites: upper-class standing; BIOBM 3300, 3330, or 3310–3320, or written permission of instructor. S–U grades only. D. Wilson. Selected papers from the literature on a given topic are evaluated critically during 12 one-hour meetings.

BIOBM 4370 Regulation of Cell Proliferation, Senescence, and Death (also BIOGD/TOX 4370)

Spring. Variable credit; students may take lec for 2 credits or lec and disc for 3 credits. Limited to about 20 students per disc; priority given to graduate students. Prerequisite: BIOG 1101–1102 or 1105–1106 and BIOBM 3300 or 3310–3320. Recommended: BIOGD 2810 and BIOBM 4320. S–U or letter grades. S. Lee.

Covers a wide spectrum of issues related to cell proliferation in eukaryotes. Lectures include various aspects of the regulation of cell division cycle and signal transduction pathways, with additional topics on oncogenesis, cell aging, and cell death. The facts as well as concepts and logics behind findings are presented in the lectures. Research articles are analyzed and discussed in depth during discussion section.

BIOBM 4380 The RNA World

Spring. 3 credits. Prerequisites: BIOBM 3300 or 3310/3320 or 3330, or permission of instructor. A. Ke. Part of the excitement about “the RNA world” stems from the recognition that RNA is ancient and that the evolution of life as we know it depended upon RNA evolving both informational and catalytic capabilities. This course explores these ideas but more generally provides a comprehensive introduction to RNA biology. Many of the most interesting topics in the RNA biology, such as the mechanism of the RNA interference and its widespread applications, will be covered in detail. Other topics require consideration of essential RNA-protein complexes such as ribosomes, spliceosomes, telomerase, and Signal recognition particles. Classical experiments as well as up-to-date research are covered in this course. A portion of each class is devoted to discussion and questions.

BIOBM 4390 Molecular Basis of Human Disease (also BIOGD 4390)

Fall. 3 credits. Prerequisites: biochemistry and molecular biology (e.g., BIOBM 3300, 3310–3320, or 3330) and genetics (e.g., BIOGD 2810) or permission of instructor. Recommended: cell biology (e.g., BIOBM 4320 or BIOAP 3160) and physiology (e.g., BIOAP 3110 or 4580). S–U or letter grades. Lec. W. L. Kraus.

This course examines how changes in the normal expression, structure, and activity of gene products caused by genetic mutations, epigenetic phenomena, and environmental agents lead to human diseases. The material focuses on how these changes lead to alterations in normal cellular processes, as well as the resulting physiological consequences. Topics are selected from hormone insensitivity syndromes, inborn errors of metabolism, gene fusions resulting in hybrid proteins, gene amplification, gene inactivation, disruption of signaling pathways, disruption of metabolic pathways, and the molecular actions of infectious agents and environmental toxins. Examples of diseases are selected to emphasize various aspects of genetics, molecular biology, cell biology, physiology, immunology, and endocrinology that have been presented in other courses. In addition, the methods used to identify the underlying biochemical and genetic basis of the diseases, as well as possible pharmaceutical and genetic therapies for treating the diseases, are presented. A portion of the lecture periods will be devoted to discussion and practice questions.

BIOBM 4400 Laboratory in Biochemistry and Molecular Biology

Fall, spring, or summer (six-week session). 4 credits. Limited enrollment. Priority given to undergraduate biology majors in Biochemistry or Molecular and Cell Biology programs of study and to graduate students with minor in field of biochemistry. Prerequisites: BIOBM 3300 or 3330 or 3310–3320 (at least one of 3310–3320 completed but one may be taken concurrently). S. Ely and H. Nivison.

Experiments related to molecular biology (includes PCR, DNA cloning, hybridization analysis, restriction mapping, and DNA sequence analysis), protein purification and analysis (salt fractionation, ion exchange chromatography, affinity chromatography, SDS-PAGE, and immunoblotting), and determination of enzyme kinetic parameters.

BIOBM 4430 Experimental Molecular Neurobiology (also BIONB 4300)

Spring. 4 credits. Limited to 12 students. Letter grades only. Disc, lab. Offered alternate years. D. L. Deitcher. For description, see BIONB 4300.

BIOBM 4500 Principles of Chemical Biology (also CHEM 4500)

Fall. 3 credits. Prerequisites: CHEM 3570–3580 or 3590–3600 or equivalent. Staff. For description, see CHEM 4500.

[BIOBM 4510 Structural Chemical Biology (also CHEM 4510)]

Spring. 3 credits. Prerequisites: CHEM 2880 and 3580 or equivalent. Next offered 2010–2011. S. Ealick. For description, see CHEM 4510.]

[BIOBM 4834 Molecular Aspects of Plant Development I (also BIOPL 4834)]

Fall. 1 credit. 12 lec. Offered alternate years; next offered 2010–2011. J. B. Nasrallah. For description, see BIOPL 4834.]

BIOBM 4850 Bacterial Genetics (also BIOMI/BIOGD 4850)

Fall. 2 or 3 credits; optional credit for registered students with permission of instructor to review literature. Prerequisite: BIOGD 2810. Recommended: BIOMI 2900 and BIOBM 3300 or 3310 and 3320 or 3330. Lec. J. E. Peters. For description, see BIOMI 4850.

BIOBM 4980 Teaching Experience

Fall or spring. 1–4 credits. Limited enrollment. Prerequisites: previous enrollment in course to be taught or equivalent. Note: Arts students may not count this course toward graduation but may, upon petition (one time only) to their class dean, carry fewer than 12 other credits and remain in good standing. This would affect Dean's List eligibility but not eligibility for graduating with distinction. S–U or letter grades by permission of instructor. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring.

BIOBM 6310 Protein Structure, Dynamics, and Function

Fall. 3 credits. Prerequisites: BIOBM 3300 or 3330 or 3310–3320 and organic chemistry. Recommended: physical chemistry course. S–U or letter grades. Lec. L. Nicholson.

Presentations on the basic principles of protein structure, dynamics, and function. Specific topics include protein stability, dynamics, evolution, molecular recognition, basic enzyme kinetics, and spectroscopic tools for studying proteins.

BIOBM 6330 Biosynthesis of Macromolecules

Fall. 2 credits. Prerequisite: BIOBM 3300 or 3330 or 3310–3320. Recommended: BIOGD 2810. Lec. J. W. Roberts and D. B. Wilson. Synthesis of DNA, RNA, and proteins, and regulation of gene expression.

BIOBM 6360 Functional Organization of Eukaryotic Cells

Spring. 3 credits. Prerequisites: BIOBM 3300 or 3330 or 3310–3320, and 4320, or equivalents. Lec. W. J. Brown and A. Bretscher.

Aims to provide an integrated view of eukaryotic cell organization as elucidated using biochemical molecular, genetic, and cell biological approaches. Major topics include the cytoskeleton, membrane traffic, and cell polarity. Together with BIOBM 4370 and 6390, this course provides broad coverage of the cell biology subject area.

BIOBM 6390 The Nucleus

Spring. 2 credits. Prerequisite: BIOBM 3300 or 3330 or 3310–3320, or equivalent. Recommended: BIOGD 2810. Lec. J. T. Lis and J. Pleiss.

Lectures on topics of eukaryotic genome organization, chromatin structure, regulation of gene expression, RNA processing, the

structure and movement of chromosomes, and nuclear export and import. Covers the structure and function of the nucleus at the molecular and cell biological levels.

BIOBM 6410 Laboratory in Plant Molecular Biology (also BIOPL 6410)

Fall. 4 credits. Prerequisites: BIOGD 2810 or equivalent, BIOBM 3300 or 3310 or equivalent, and permission of instructor. S-U grades by permission of instructor. Lab. M. R. Hanson, J. Nasrallah, K. Van Wijk, and staff.

For description, see BIOPL 6410.

BIOBM 7300 Protein NMR Spectroscopy (also VETMM 7070)

Spring. 2 credits. Prerequisites: CHEM 3890 and 3900, or 2870 and 2880, or permission of instructor. S-U or letter grades. Offered alternate years. Lec. L. K. Nicholson and R. E. Oswald.

Students acquire the tools necessary for understanding multidimensional NMR of proteins. NMR fundamentals and schemes for magnetization transfer, water suppression, decoupling, and others are presented.

BIOBM 7380 Macromolecular Crystallography (also CHEM 7880)

Spring. 3 credits. Prerequisite: permission of instructor. Lec. S. E. Ealick.

For description, see CHEM 7880.

BIOBM 7510 Ethical Issues and Professional Responsibilities

Spring. 1 credit. Prerequisite: graduate students beyond first year. S-U grades only. Organizational meeting first W of semester. Sem. P. Hinkle.

Ethical issues in research and the professional responsibilities of scientists are discussed based on readings and occasional lectures. The topics are intended to cover the requirements for ethical training of graduate students on training grants and follow the recommendations of the Office of Research Integrity.

BIOBM 7940 Current Topics in Biochemistry

Fall or spring. 0.5 or 1 credit for each topic; may be repeated for credit.

Prerequisite: BIOBM 3300 or 3330 or 3310-3320 or equivalent. S-U grades only. Staff.

Lectures and seminars on specialized topics. Topics for fall and spring to be announced in the course and time roster published at the beginning of each semester or the department mini-courses web site, www.mbg.cornell.edu/cals/mbg/about/courses/mini-courses.cfm.

BIOBM 8300 Biochemistry Seminar

Fall or spring. 0 credits. Prerequisite: graduate students majoring in field of biochemistry, molecular and cell Biology. Lec open to everyone. V. Vogt.

Lectures on current research in biochemistry, presented by distinguished visitors and staff members.

BIOBM 8310 Advanced Biochemical Methods I

Fall. 6 credits. Requirement for, and limited to, first-year graduate students in field of biochemistry, molecular and cell biology. S-U grades only. Lab and disc. Organizational meeting first F of semester 10:10. T. C. Huffaker and J. Pleiss.

The first half of this course comprises an intensive laboratory covering fundamental aspects of modern molecular biology and cell biology. The second half comprises research in the laboratory of a professor chosen by the

student (see BIOBM 8320). Students must enroll separately for each half.

BIOBM 8320 Advanced Biochemical Methods II

Spring. 6 credits. Requirement for, and limited to, first-year graduate students in field of biochemistry, molecular and cell biology. S-U grades only. Lab. V. Vogt.

Research in the laboratories of two different professors chosen by the student. Arrangements are made jointly between the director of graduate studies and the research advisor.

BIOBM 8330 Research Seminar in Biochemistry

Fall or spring. 1 credit each semester; may be repeated for credit. Requirement for, and limited to, second-, third-, and fourth-year graduate students majoring in field of biochemistry, molecular and cell biology. S-U grades only. W. L. Kraus and V. M. Vogt.

Each student presents one seminar per year on his or her thesis research and then meets with instructors and thesis committee members for evaluation.

BIOBM 8360 Methods and Logic in Biochemistry, Molecular and Cell Biology, Part I

Spring. 1 credit. Prerequisite: first-year graduate students majoring in field of biochemistry, molecular and cell biology.

S-U grades only. Sem and disc. G. P. Hess. Seminar with critical discussion by students of original research papers selected by faculty members of the field of biochemistry, molecular and cell biology.

BIOBM 8380 Scientific Communication and Quantitation in Biochemistry, Molecular and Cell Biology (BMCB)

Spring. 2 credits. Prerequisite: second-year graduate students majoring in field of biochemistry, molecular and cell biology or field of genetics and development. S-U grades only. D. Shalloway.

Interactive seminar to develop the general skills needed to support a career in scientific research: experimental design, writing scientific papers and grants, oral presentation, basic statistical and computational methods, and managing a research laboratory. Exercises focus on the preparation of a mock research grant proposal.

Related Courses in Other Departments

Lipids (NS 6020)

Undergraduate Research in Biology (BIOG 4990)

ECOLOGY AND EVOLUTIONARY BIOLOGY (BIOEE)

BIOEE 1250 Biology Seminar

Fall or spring. 1 credit. Prerequisite: first-year standing or permission of instructor. S-U grades only. Staff.

A first-year seminar designed for students with Biology AP credit or a strong interest in research. Students will interact with faculty while learning to read and evaluate scientific publications on current biological topics. Multiple topics and sections will be offered each semester.

BIOEE 1540 Introductory Oceanography, Lectures (also EAS 1540)

Fall. 3 credits; optional 1-credit laboratory offered as BIOEE/EAS 1550. S-U or letter grades. B. C. Monger.

For description, see EAS 1540.

BIOEE 1550 Introductory Oceanography, Laboratory (also EAS 1550)

Fall. 1 credit. Corequisite: BIOEE/EAS 1540. S-U or letter grades. B. C. Monger.

For description, see EAS 1550.

BIOEE 2070 Evolution (also HIST 2870, STS 2871)

Fall or summer (six-week session). 3 credits. Intended for students with no background in college biology. May not be taken for credit after BIOEE 2780. Does not meet evolutionary biology requirement for biological sciences major. S-U or letter grades. W. B. Provine.

Evolution is the central concept in biology. This course examines evolution in historical and cultural contexts. This course aims to understand the major issues in the history and current status of evolutionary biology and explore the implications of evolution for culture. Issues range from controversies over mechanisms of evolution in natural populations to the conflict between creationists and evolutionists.

BIOEE 2610 Ecology and the Environment

Fall or summer (three-week session). 4 credits. Prerequisite: one year introductory biology. S-U or letter grades. Fall: J. Sparks; summer: A. T. Vawter.

Fall: Explores interactions between the environment and organisms in the context of individuals, populations, communities, and ecosystems. Emphasizes basic ecological principles and processes intrinsic to understanding the world around us and in more advanced studies in the environmental sciences, including management-oriented disciplines. Major topics include adaptive strategies of organisms, population dynamics, species interactions, community structure and ecosystem function, biodiversity, biogeochemistry, productivity, human influences on ecosystems, and sustainable practices.

Summer: Introduction to principles of ecology, concerning the interactions between organisms and their environment. Deals with both terrestrial and aquatic ecology, drawing examples from both plant and animal studies. Phenomena that occur at the individual, population, community, and ecosystem levels of organization are examined through classroom lectures and discussion and through a series of lab and field experiences in natural habitats around Ithaca. Ecological principles are applied extensively to current environmental problems and issues.

BIOEE 2630 Field Ecology

Fall. 3 credits. Pre- or corequisite: BIOEE 2610. Letter grades only. One weekend field trip. A. Kessler.

Field exercises designed to give students direct experience with fieldwork, with emphasis on developing observational skills, journal keeping, and a landscape perspective. Topics include plant succession, niche relationships of insects, influence of herbivores and competition on plant performance, decomposition of soil litter, foraging behavior, census methods, and use of scientific collections.

BIOEE 2640 Tropical Field Ornithology

Winter, two-week, full-time course. 3 credits. Limited to 14 students; minimum of 8. Prerequisite: permission of instructor. Intended for students with limited or no bird knowledge. S-U or letter grades. Fee: \$250. Daily fieldwork, disc, reading, and individual project. A. A. Dhondt.

Provides students with the opportunity to study birds intensively in a neotropical environment. Students learn observational and field techniques, participate in group research projects and in daily seminars. The group is housed in the Biodiversity Center at Punta Cana. One or two field trips are taken to national parks in the Dominican Republic.

BIOEE 2650 Tropical Field Ecology and Behavior

Winter, field course based in Kenya, Africa. 4 credits. Limited to 15 students. Prerequisites: one introductory biology course and permission of instructors. Letter grades only. I. J. Lovette and D. Rubenstein.

Gives students a broad hands-on understanding of tropical biology, ecology, and behavioral ecology. Students gain experience with experimental design and data collection, field methods, basic statistics, interpretation and evaluation of primary scientific literature, and scientific paper writing. Students pay separately for their international airfare and there may also be a small supplementary laboratory fee.

BIOEE 2670 Introduction to Conservation Biology

Fall. 2 or 3 credits, 3 credits with disc sec, two Sat a.m. field trips, and two essays. Intended for both science and nonscience majors. May not be taken for credit after NTRES 4100. Completion of BIOEE 2670 not required for NTRES 4100. S-U or letter grades. Offered alternate years. J. W. Fitzpatrick.

Broad exploration of biological concepts and practices related to conserving the earth's biodiversity; integrates ecological, evolutionary, behavioral, and genetic principles important for understanding conservation issues of the 21st century. Topics include species and ecosystem diversity, values of biodiversity, causes of extinction, risks facing small populations, simulation modeling, design of nature preserves, the Endangered Species Act, conservation priority-setting, species recovery, ecosystem restoration and management, implications of climate change, and our ecological footprint.

BIOEE 2740 The Vertebrates: Structure, Function, and Evolution

Spring. 4 credits. Prerequisite: one year introductory biology. Fee: \$25. S-U or letter grades. B. A. McGuire.

Introductory course in vertebrate organismal biology that explores the structure and function of vertebrates with an emphasis on trends in vertebrate evolution. Lectures cover topics such as the origin and evolution of various vertebrate groups, sensory systems, thermoregulation, life history, locomotion, feeding, size, and scaling. Laboratories include dissections of preserved vertebrate animals and noninvasive live animal demonstrations.

BIOEE 2780 Evolutionary Biology

Fall or spring. 3 or 4 credits; 4-credit option involves writing component and two disc per week; 4-credit option limited to 20 students per sec each semester. (Students may not preregister for 4-credit option; interested students complete application form on first day of class.) Limited to 300 students. Prerequisite: one year introductory biology or permission of instructor; first-semester freshmen by permission of instructor. S-U or letter grades. One all-day Sat. field trip. Evening prelims: spring, Mar. 4 and April 6. Fall, I. Lovette; spring, staff.

Considers explanations for patterns of diversity and for the apparent good fit of organisms to the environment. Topics include the genetic and developmental basis of evolutionary change, processes at the population level, the theory of evolution by natural selection, levels of selection, concepts of fitness and adaptation, modes of speciation, long-term trends in evolution, rates of evolution, and extinction. Students taking the 4-credit option read additional materials from the primary literature and write a series of essays in place of the regular prelims.

BIOEE 3500 Dynamics of Marine Ecosystems (also EAS 3500)

Fall. 3 credits. Limited to 25 students. Prerequisites: one year of calculus and semester of oceanography (i.e., BIOEE/EAS 1540), or permission of instructor. S-U or letter grades. Offered alternate years. C. H. Greene and R. W. Howarth.

For description, see EAS 3500.

BIOEE 3510 Conservation Oceanography (also EAS 3510)

Spring, full-time, three-week course. 4 credits. Limited to 25 students. Prerequisites: enrollment in Cornell Abroad Earth and Environmental Sciences Semester in Hawaii; one semester of calculus and two semesters of biology or permission of instructor. Letter grades only. C. H. Greene, C. D. Harvell, and B. C. Monger.

For description, see EAS 3510.

[BIOEE 3620 Dynamic Models in Biology (also MATH 3620)]

Spring. 4 credits. Prerequisites: two semesters introductory biology (BIOG 1101-1102, 1105-1106, 1107-1108, 1109-1110 or equivalent) and completion of mathematics requirements for Biological Sciences major or equivalent. S-U or letter grades. Offered alternate years; next offered 2010-2011. S. P. Ellner and J. M. Guckenheimer.

Introductory survey of the development, computer implementation, and applications of dynamic models in biology and ecology. Case-study format covering a broad range of current application areas such as regulatory networks, neurobiology, cardiology, infectious disease management, and conservation of endangered species. Students also learn how to construct and study biological systems models on the computer using a scripting and graphics environment.]

[BIOEE 3630 Field Methods in Ornithological Research

Summer (eight-week session). 5 credits. Limited to 15 students. Prerequisites: introductory biology or equivalent, interest and ability to spend all day in the field under variable weather conditions, including intense sun and periods of rain, and permission of instructor. S-U or letter

grades. Next offered 2011-2012. D. W. Winkler and staff.]

BIOEE 3690 Chemical Ecology (also BIONB/ENTOM 3690)

Spring. 3 credits. Prerequisites: one semester of introductory biology for majors or nonmajors and one semester of introductory chemistry for majors or nonmajors or equivalents, or permission of instructor. S-U or letter grades. J. S. Thaler, A. Kessler, A. Agrawal, and R. Raguso.

Why are chilies so spicy? This course examines the chemical basis of interactions between species and is intended for students with a basic knowledge of chemistry and biology. Focuses on the ecology and chemistry of plants, animals, and microbes. Stresses chemical signals used in diverse ecosystems, using Darwinian natural selection as a framework. Topics include plant defenses, microbial warfare, communication in marine organisms, and human pheromones.

[BIOEE 3710 Human Paleontology (also ANTHR 3710)]

Fall. 4 credits. Limited to 18 students. Prerequisite: one year introductory biology or ANTHR 1300 or permission of instructor. Letter grades only. Occasional field trips. Next offered 2011-2012. K. A. R. Kennedy.]

BIOEE 3730 Biodiversity and Biology of the Marine Invertebrates

Fall (but course must be taken previous summer at Shoals Marine Laboratory [SML]), three-week, full-time course. 5 credits (students enroll for credit during fall semester). Limited to 24 students. Prerequisites: one year introductory biology for majors; permission of faculty because off campus. Letter grades only. Daily and evening lec, lab, and fieldwork. Total cost for room, board, and overhead at SML: \$2,426. Offered alternate years. C. D. Harvell.

Introduction to the biology and evolution of the major invertebrate phyla, concentrating on marine representatives. In addition to the evolution of form and function, lectures cover aspects of ecology, behavior, physiology, chemical ecology, and natural history of invertebrates. SML exposes students to a wealth of marine and terrestrial invertebrates in their natural habitats. Regular field excursions allow an excellent opportunity to study freshly collected and in situ representatives of most of the major phyla.

BIOEE 4460 Plant Behavior—Induced Plant Responses to Biotic Stresses, Lectures (also BIONB 4460)

Spring. 3 credits. Prerequisite: BIOEE 2610 or permission of instructor. S-U or letter grades. A. Kessler and R. Raguso.

How do plants respond to herbivore attack? What are the molecular, plant hormonal, metabolic mechanisms of these responses? What ecological consequences do these responses have for the fitness of the plants and their attackers? The course provides an overview of the plant's myriad responses to herbivores and compares them with responses to pathogens. It gives an introduction to the study of induced plant responses in the lectures as well as practical independent and group-intensive work.

BIOEE 4461 Plant Behavior—Induced Plant Responses to Biotic Stresses, Laboratory (also BIONB 4461)

Spring. 1 credit. Limited to 12 students. Pre- or corequisite: BIOEE 4460 or BIONB 4460. S-U or letter grades. A. Kessler and R. Raguso.

Laboratory course covering topics presented in BIOEE 4460/BIONB 4460.

[BIOEE 4500 Mammalogy, Lectures

Spring. 3 credits. Recommended: BIOEE 2740. Letter grades; S-U grades by permission of instructor. Offered alternate years; next offered 2010-2011. B. A. McGuire.]

[BIOEE 4501 Mammalogy, Laboratory

Spring. 1 credit. Limited to 16 students. Pre- or corequisite: BIOEE 4500. Letter grades; S-U grades by permission of instructor. Fee: \$20. Travel to Cornell University Museum of Vertebrates (CUMV) at the Laboratory of Ornithology is necessary. One all-day field trip may be scheduled. Offered alternate years; next offered 2010-2011. B. A. McGuire.]

[BIOEE 4530 Speciation

Spring. 4 credits. Limited to 40 students. Prerequisites: BIOEE 2780 and BIOGD 2810 or equivalents, or permission of instructor. S-U or letter grades. Offered alternate years; next offered 2010-2011. R. G. Harrison.]

[BIOEE 4550 Insect Ecology (also ENTOM 4550)

Fall. 4 credits. Recommended: ENTOM 2120 or BIOEE 2610 or permission of instructor. S-U or letter grades. Offered alternate years; next offered 2010-2011. J. S. Thaler.

For description, see ENTOM 4550.]

BIOEE 4560 Stream Ecology (also NTRES 4560)

Fall. 4 credits. Prerequisite: BIOEE 2610 or permission of instructor. S-U or letter grades. Field project with lab papers. One Sat. field trip. Offered alternate years.

A. S. Flecker and C. E. Kraft.

For description, see NTRES 4560.

BIOEE 4570 Limnology: Ecology of Lakes, Lectures

Spring. 3 credits. Prerequisite: BIOEE 2610 or written permission of instructor. Recommended: introductory chemistry. Letter grades; S-U grades by permission of instructor only. Offered alternate years. N. G. Hairston, Jr.

Limnology is the study of fresh waters and other inland, nonmarine environments. This course focuses on lakes and ponds, which are discussed as distinct aquatic environments with clear terrestrial boundaries, and within which ecological interactions are especially evident. In lakes, interactions between organisms are often strong and adaptations easily recognized. Physical and chemical properties of the environment impact organisms in important ways and organisms, likewise, influence physics and chemistry. As a result, lakes provide excellent systems for understanding the links between physical (thermal and mixing), chemical (dissolved elements and compounds), and organismal dynamics. Lakes are exciting environments for study in their own right and for gaining perspective on ecological and evolutionary processes in general.

BIOEE 4571 Limnology: Ecology of Lakes, Laboratory

Spring. 2 credits. Pre- or corequisite: BIOEE 4570. Letter grades; S-U grades by permission of instructor only. One weekend field trip. Fee for food on field trip: \$15. Offered alternate years. N. G. Hairston, Jr. and staff.

Laboratories and field trips devoted to studies of the biological, chemical, and physical properties of lakes and other freshwater environments. Exercises focus on understanding the freshwater environment, on experimentation, and on understanding ecological processes within lakes. Optional vertebrate dissection (fish) during one laboratory exercise and during a portion of the weekend field trip.

BIOEE 4580 Community Ecology

Spring. 4 credits. Prerequisites: BIOEE 2610, 2780, or permission of instructor. S-U or letter grades. Offered alternate years. M. A. Geber and A. Agrawal.

Intersection between ecology and evolution of species interactions. Covers historical and current views on community structure and diversity. Topics include impacts of species interactions on ecology and evolution of community players, multispecies webs, and natural selection in complex communities. Approach is empirical and methodological.

[BIOEE 4600 Theoretical Ecology

Spring. 4 credits. Limited enrollment. Prerequisites: completion of Biological Sciences mathematics requirement or equivalent, and either one additional semester of mathematics, statistics, or modeling (e.g., BEE 2600/4530/4750, NTRES 3100/4110, BIONB 4220) or permission of instructor. S-U or letter grades. Offered alternate years; next offered 2011-2012. S. P. Ellner.]

[BIOEE 4620 Marine Ecology (also EAS 4620)

Fall. 3 credits. Limited to 75 students. Prerequisite: BIOEE 2610. Letter grades; S-U grades by permission of instructor only. Offered alternate years; next offered 2010-2011. C. D. Harvell and C. H. Greene.]

BIOEE 4640 Macroevolution

Spring. 4 credits. Limited to 35 students. Prerequisite: BIOEE 2780 or permission of instructor. Interested graduate students strongly encouraged to preregister. Letter grades; S-U grades by permission of instructor only. Offered alternate years. A. R. McCune.

Advanced course in evolutionary biology centered on large-scale features of evolution. Areas of emphasis include phylogeny reconstruction, patterns and processes of speciation, the origin of evolutionary novelty, causes of major evolutionary transitions, and patterns of diversification and extinction in the fossil record. Discussion of these problems involves data and approaches from genetics, morphology, systematics, paleobiology, development, and ecology.

[BIOEE 4660 Physiological Plant Ecology, Lectures

Spring. 3 credits. Limited to 30 students. Prerequisite: BIOEE 2610 or introductory plant physiology. Letter grades; S-U grades by permission of instructor only. Offered alternate years; next offered 2010-2011. J. P. Sparks.]

[BIOEE 4661 Physiological Plant Ecology, Laboratory

Spring. 2 credits. Limited to 15 students. Pre- or corequisite: BIOEE 4660. Letter grades only. Offered alternate years; next offered 2010-2011. J. P. Sparks.]

BIOEE 4670 Seminar in the History of Biology (also HIST 4150, BSOC/STS 4471)

Fall or summer (six-week session). 4 credits. Limited to 18 students. S-U or letter grades. W. B. Provine.

Specific topics change each year.

[BIOEE 4690 Food, Agriculture, and Society (also BSOC/STS 4691)

Spring. 3 credits. Limited to 20 students. Prerequisite: introductory ecology course or permission of instructor. S-U or letter grades. Next offered 2010-2011. A. G. Power.]

[BIOEE 4700 Herpetology, Lectures

Spring. 2 credits. Limited to 50 students. Recommended: BIOEE 2740 and concurrent enrollment in BIOEE 4701. Letter grades; S-U grades by permission of instructor only. Offered alternate years; next offered 2010-2011. H. W. Greene.]

[BIOEE 4701 Herpetology, Laboratory

Spring. 2 credits. Limited to 35 students. Pre- or corequisite: BIOEE 4700. Letter grades; S-U grades by permission of instructor only. Fee: \$30. Occasional field trips and special projects. Offered alternate years; next offered 2010-2011. H. W. Greene.]

[BIOEE 4730 Ecology of Agricultural Systems (also HORT 4730)

Fall. 3 credits. Limited to 45 students. Prerequisite: BIOEE 2610 or permission of instructor. S-U or letter grades. During first six weeks of class, Thurs. meetings may run later because of field trips. Next offered 2010-2011. L. E. Drinkwater.]

BIOEE 4750 Ornithology

Spring. 4 credits. Limited to 35 students. Prerequisite: permission of instructor by preregistering in E141 Corson Hall. Recommended: BIOEE 2740. Letter grades; S-U grades by permission of instructor only. Carpooling to Lab of Ornithology necessary. Fee: \$15. Occasional field trips and special projects. Offered alternate years. D. W. Winkler.

Lectures cover various aspects of the biology of birds, including anatomy, physiology, systematics, evolution, behavior, ecology, and biogeography. Laboratory includes dissection of dead material, studies of skeletons and plumages, and specimen identification of avian families of the world and species of New York.

[BIOEE 4760 Biology of Fishes

Fall. 4 credits. Limited to 24 students. Recommended: BIOEE 2740 or equivalent experience in vertebrate zoology. Letter grades; S-U grades by permission of instructor only. Small lab fee may be required. Two field trips. Offered alternate years; next offered 2010-2011. A. R. McCune.]

BIOEE 4770 Marine Invertebrates Seminar

Fall. 1 credit. Prerequisite: BIOEE 3730 or permission of instructor. S-U grades only. Offered alternate years. C. D. Harvell.

Discussions and directed readings center on current research themes in invertebrate biology. Designed as an on-campus companion course to the field-based BIOEE 3730 Biodiversity and Biology of the Marine Invertebrates. Students write individual research essays based on projects done in the field.

[BIOEE 4780 Ecosystem Biology

Spring, 4 credits. Prerequisite: BIOEE 2610 or equivalent. S-U or letter grades. Offered alternate years; next offered 2010–2011. C. L. Goodale and R. W. Howarth.]

BIOEE 4790 Paleobiology (also EAS 4790)

Spring, 4 credits. Prerequisites: one year introductory biology for majors and either BIOEE 2740, 3730, EAS 3010, or permission of instructor. S-U or letter grades. W. D. Allmon.

For description, see EAS 4790.

[BIOEE 4800 Ecological Genetics (also ENTOM 4700)

Spring, 4 credits. Prerequisite: BIOEE 2780. Recommended: introductory course in genetics and/or statistics. S-U or letter grades. Offered alternate years; next offered 2010–2011. B. P. Lazzaro.

For description, see ENTOM 4700.]

[BIOEE 4900 Topics in Marine Biology

Spring, 2 credits; may be repeated for credit. Limited to 15 students. Prerequisite: permission of instructor. Primarily for undergraduates. S-U or letter grades. Offered alternate years. J. G. Morin.

Seminar courses on selected topics in marine biology; may include laboratory or field trips. Topics and time of organizational meeting are shown in departmental course offerings listed on the web site.]

BIOEE 4980 Teaching Experience

Fall or spring, 1–4 credits. Limited enrollment. Prerequisites: previous enrollment in course to be taught or equivalent. Note: Arts students may not count this course toward graduation but may, upon petition (one time only) to their class dean, carry fewer than 12 other credits and remain in good standing. This would affect Dean's List eligibility but not eligibility for graduating with distinction. S-U or letter grades by permission of instructor. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring.

BIOEE 6600 Field Studies in Ecology and Evolutionary Biology

Fall or spring. Variable credit. Prerequisites: BIOEE 2610, taxon-oriented course, and permission of instructor. Letter grades; S-U grades by permission of instructor only. Lec and field trips TBA. Estimated costs: TBA. Staff.

Provides students with opportunities to learn field techniques and new biota by participating in an intensive series of field exercises. Extended field trips may be scheduled during fall break, intercession, or spring break. The regions visited, trip objectives, and other details are announced by the various instructors at an organizational meeting held at the beginning of the semester.

Meetings on campus are devoted to orientation and reports on completed projects.

[BIOEE 6601 Tropical Field Ecology

Spring, 2 credits. Prerequisite: for undergraduates, experience or course work with terrestrial, marine, or freshwater organisms. Extended field trip over winter break. Letter grades only. Fee to cover transportation and housing: TBA. Offered alternate years; next offered 2010–2011. C. D. Harvell, J. P. Sparks, and N. G. Hairston, Jr.]

BIOEE 6602 Graduate Field Course in Ecology

Spring, 3 credits. Prerequisite: graduate standing. Letter grades only. Fee charged to help cover food and lodging for trip to Florida. Offered alternate years. J. P. Sparks and H. W. Greene.

Designed to give graduate students experience in defining questions and designing field investigations. The course is based at the Archbold Biological Station in central Florida over spring break and during the following week. The class visits several ecosystems including sand pine scrub, cattle ranches, cypress swamps, and the Everglades.

BIOEE 6610–6611 Environmental Policy (also ALS 6610–6611, BSOC 4611–4612)

6610, fall; 6611, spring, 3 credits each semester; students must register for 6 credits each semester since R grade given at end of fall semester. Limited to 12 students. Prerequisite: permission of instructor. Letter grades only. D. Pimentel.

Focuses on complex environmental issues. Ten to 12 students, representing several disciplines, investigate significant environmental problems. The research team spends two semesters preparing a scientific report for publication in *Science* or *BioScience*. Thus far, every study has been published.

BIOEE 6680 Principles of Biogeochemistry

Spring, 4 credits. Limited to 20 students. Prerequisite: solid background in ecology, environmental chemistry, or related environmental science; for undergraduates, permission of instructor. S-U or letter grades. Offered alternate years. R. W. Howarth and C. L. Goodale.

Lectures cover the biotic controls on the chemistry of the environment and the chemical control of ecosystem function. Emphasis is on cycles of major elements and minor elements globally and in selected ecosystems, stressing the coupling of element cycles. A comparative approach is used to illustrate similarities and differences in element cycling among ecosystems. Analysis of both theoretical and applied issues, including global atmospheric changes and factors controlling the acidification of lakes and soils.

[BIOEE 6710 Palaeoanthropology of South Asia (also ANTHR 6371, ASIAN 6671)

Fall, 3 credits. Limited to 15 students. Letter grades only. Next offered 2011–2012. K. A. R. Kennedy.]

[BIOEE 6730 Human Evolution: Concepts, History, and Theory (also ANTHR 6373)

Spring, 3 credits. Prerequisite: one year introductory biology or ANTHR 1300 or permission of instructor. Letter grades only. Next offered 2011–2012. K. A. R. Kennedy.]

[BIOEE 6750 Current Topics in Plant Molecular Ecology

Fall, 1 credit; may be repeated for credit. Limited to 20 students. Prerequisite: graduate standing or permission of instructor. S-U or letter grades. Offered alternate years; next offered 2010–2011. A. Kessler.]

BIOEE 7600 Special Topics in Evolution and Ecology

Fall or spring, 1–3 credits; may be repeated for credit. Limited enrollment. Letter grades; S-U grades by permission of instructor only. Staff.

Independent or group-intensive study of special topics of current interest. Content varies each semester.

[BIOEE 7610 Microsatellite DNA: Techniques

Fall, 1 credit; may be repeated for credit. Limited to 12 students. Prerequisite: permission of instructor. Primarily for graduate students; undergraduates admitted only under exceptional circumstances. E-mail S. M. Bogdanowicz (smb31) by end of Aug. if interested. S-U grades only. Fee: TBA. Next offered 2010–2011. R. G. Harrison and S. M. Bogdanowicz.]

BIOEE 7640 Plant-Insect Interactions Seminar

Fall or spring, 1 credit; may be repeated for credit. Prerequisite: for undergraduates, permission of instructor. S-U grades only. A. Agrawal, J. S. Thaler, and A. Kessler.

Group intensive study of current research in plant-insect interactions. Topics vary from semester to semester but include chemical defense, coevolution, insect community structure, population regulation, biocontrol, tritrophic interactions, and mutualism.

BIOEE 7670 Current Topics in Ecology and Evolutionary Biology

Fall, 4 credits. Prerequisite: for undergraduates, permission of instructor. S-U grades only. Staff.

Critical evaluation and discussion of theory and research in ecology and evolutionary biology. Lectures by faculty and student-led discussions of topics in areas of current importance.

BIOEE 7700 Workshop in Biogeochemistry

Fall or spring, 1–3 credits; may be repeated for credit. Limited to 15 students. Prerequisite: BIOEE 6680. S-U grades only. Staff.

Workshop-forum in which graduate students interact with invited world leaders in biogeochemistry. Workshop topics change each semester. A one-week workshop is preceded by seven one-hour preparatory discussions of readings.

BIOEE 7800 Graduate Seminar in Ornithology (also NTRES 7800)

Fall or spring, 1 credit; may be repeated for credit. Prerequisite: for undergraduates, permission of instructor. S-U grades only. I. J. Lovette, A. A. Dhondt, D. W. Winkler, and J. L. Dickinson.

Group intensive study of current research in ornithology. Topics vary from semester to semester.

BIOEE 8990 M.S. Thesis Research

Fall or spring, 1–15 credits. Prerequisite: admission to field of ecology and evolutionary biology. S-U or letter grades. E&B field faculty.

Thesis research conducted by an M.S. student in the field of ecology and evolutionary biology with advice and consultation of a major professor who is a member of the field.

BIOEE 9990 Ph.D. Dissertation Research

Fall or spring, 1–15 credits. Prerequisite: admission to field of ecology and evolutionary biology as Ph.D. student. S–U or letter grades. E&EB field faculty. Dissertation research conducted by a Ph.D. student in the field of ecology and evolutionary biology with advice and consultation of a major professor who is a member of the field.

Related Courses in Other Departments

Ethics and the Environment (BSOC/STS 2061, PHIL 2460)

Physical Hydrology for Ecosystems (BEE 3710)

Evolution of the Earth and Life (EAS 1700)

General Microbiology, Lectures (BIOMI 2900)

Prokaryotic Diversity (BIOMI 4140)

Microbial Ecology (BIOMI 4180)

Neurobiology and Behavior I: Introduction to Behavior (BIONB 2210)

Methods in Animal Behavior (BIONB 3230)

Insect Behavior (BIONB/ENTOM 3250)

Ecology of Animal Behavior (BIONB/BIOSM 3290)

Modeling Behavioral Evolution (BIONB 4220)

Animal Communication (BIONB 4260)

Darwinian Medicine (BIONB 4270)

Introductory Botany (BIOPL 2410)

Taxonomy of Vascular Plants (BIOPL 2480)

Phylogenetic Systematics (BIOPL/ENTOM 4400)

Molecular Systematics (BIOPL 4470)

Plant Evolution and the Fossil Record (BIOPL 4480)

Principles and Practice of Historical Biogeography (BIOPL/ENTOM 4530)

Field Ornithology (BIOSM 3740)

Field Marine Biology and Ecology (FMBE) (BIOSM 3750)

Marine Botany (BIOSM 4490)

Biological Statistics I (BTRY 3010, NTRES 3130)

Statistical Genomics (BTRY 4820)

Statistical Methods III: Categorical Data (BTRY 6030, ILRST 4110)

Soil Science (CSS 2600)

Geographic Information Systems (CSS 4200)

Practicum in Forest Farming as an Agroforestry System (CSS/HORT/NTRES 4260)

Soil Ecology (CSS/HORT 4660)

Introductory Geological Sciences (To Know Earth) (EAS 1101)

Evolution of the Earth System (EAS 3010)

Introduction to Biogeochemistry (EAS/NTRES 3030)

Insect Biology (ENTOM 2120)

Insect Phylogeny and Evolution (ENTOM 3310)

Maggots, Grubs, and Cutworms: Larval Insect Biology (ENTOM 3330)

Techniques of Multivariate Analysis (ILRST 4100)

Human Biology and Evolution (NS/ANTHR 2750)

Environmental Conservation (NTRES 2010)

Applied Population Ecology (NTRES 3100)

Global Ecology and Management (NTRES 3220)

Forest Ecology (NTRES 4200)

Forest Ecology, Laboratory (NTRES 4201)

Wetland Ecology, Lec/Lab (NTRES 4220/4221)

Fungi (PLPA 3090)

GENETICS AND DEVELOPMENT (BIOGD)

BIOGD 1250 Biology Seminar

Fall and spring, 1 credit. Prerequisite: first-year standing or permission of instructor. S–U grades only. Staff.

A first-year seminar designed for students with Biology AP credit or a strong interest in research. Students will interact with faculty while learning to read and evaluate scientific publications on current biological topics. Multiple topics and sections will be offered each semester.

BIOGD 1320 Orientation Lectures in Molecular Biology and Genetics (also BIOBM 1320)

Spring, weeks 1–3. 0 credits. Primarily for freshmen, sophomores, and transfer students. S–U grades only. J. Blankenship. For description, see BIOBM 1320.

BIOGD 2800 Lectures in Genetics

Fall, spring, or summer (eight-week session). 3 credits. Lec component of BIOGD 2810. Not open to students majoring in biological sciences; may not be used to fulfill requirements for biological sciences major. Prerequisites: one year introductory biology or equivalent, or permission of instructor. Highly recommended: problem-solving sessions. T. D. Fox, M. L. Goldberg, and D. Nero. For description, see BIOGD 2810.

BIOGD 2810 Genetics

Fall, spring, or summer (eight-week session). 5 credits. Not open to freshmen fall semester. Prerequisite: one year introductory biology or equivalent. Lec, lab. Fall and spring classes planned T, W, R, F, 2:30–4:30. Lab sign-ups done in first lec. Highly recommended: problem-solving sessions. T. D. Fox, M. L. Goldberg, and D. Nero.

General introduction to the fundamental principles of genetics in eukaryotes and prokaryotes. Topics include gene transmission, linkage, recombination, structure, mutations, and manipulation, as well as analysis of genomes in individuals and populations.

BIOGD 2820 Human Genetics

Spring. 2 or 3 credits; 2 credits if taken after BIOGD 2810. Prerequisite: one year introductory biology or equivalent. S–U or letter grades. Lec. M. L. Goldberg and D. Nero.

Designed for nonmajors. Lectures provide the technical background needed to understand controversial personal, social, and legal implications of modern genetics that are discussed in section meetings.

BIOGD 3850 Developmental Biology

Fall. 3 credits. Prerequisite: BIOGD 2810. Lec. K. Liu.

Introduction to the morphogenetic, molecular and cellular, and genetic aspects of the developmental biology of animals.

BIOGD 3940 Circadian Rhythms (also ENTOM/BIONB/PLPA 3940)

Fall. 2–3 credits. Prerequisite: ENTOM 2120 or BIOGD 2810 or BIONB 2210 or 2220 or permission of instructor. S–U or letter grades. Lec. K. Lee.

This course will explore a fundamental feature of living organisms found in all kingdoms: how the cellular 24-hour biological clock operates and influences the biological activities. The course will cover fundamental properties of biological rhythms and cellular and molecular structure of circadian oscillators of model organisms including cyanobacteria, fungi, insects, plants, and mammals. One-credit (optional) lab module offered in conjunction with lec.

BIOGD 3990 Research Practicum in Molecular and Cellular Biology

Fall or spring. 4 credits. Limited to 12 students. Prerequisites: genetics (BIOGD 2810) or biochemistry (BIOBM 3300 or BIOBM 3310 or BIOBM 3320 or BIOBM 3330) and permission of instructor. Lec. Letter grades. Taught occasionally. Check with Dept. of MGB for scheduling.

Organizational meeting to schedule open lab times on first day of class. Staff.

A laboratory course that integrates ongoing faculty research to introduce students to a project-based research environment. Students will engage in the practice of doing science by direct participation in current projects using a variety of experimental methodologies from molecular and cellular biology, biochemistry, genetics, genomics, and computational biology. Students will work in collaborative research groups to approach and solve scientific problems through rigorous inquiry and exchange. Credit may be awarded to a maximum of two consecutive semesters.

BIOGD 4000 Genomics

Fall. 3 credits. Prerequisites: one year introductory biology plus BIOGD 2810 or 3300 or 3330 or 3310/3320 or permission of instructor. S–U or letter grades. Lec. J. Schimenti.

Introduction to principles underlying the organization of genomes and the methods of studying them, emphasizing genome-wide approaches to research. Covers the application of genomics methodologies for addressing issues including gene regulation, evolution, complex systems, genetics, and gene: phenotype relationships. Landmark and timely genomics papers and other research developments will be discussed. Basic bioinformatics tools will be incorporated.

BIOGD 4010 Genomic Analysis

Spring. 3 credits. Prerequisite: BIOGD 4000 or permission of instructor. Lec. T. P. O'Brien.

Overview of approaches and tools used in genomics research. Covers experimental and computational technologies as well as theoretical concepts important for the study of genomes and their function. Topics include genome sequencing and assembly, high-throughput sequencing, comparative genomics, genetic variation and complex traits, expression profiling and proteomics, genome modification and transgenesis, modeling network structure and dynamics. Discussions will explore how genomic tools and approaches can be integrated to study biological systems.

BIOGD 4370 Regulation of Cell Proliferation, Senescence, and Death (also BIOBM/TOX 4370)

Spring. Variable credit; students may take lec for 2 credits or lec and disc for 3 credits. Limited to about 20 students per disc; priority given to graduate students. Prerequisites: BIOG 1101–1102 and BIOBM 3300 or 3310/3320. Recommended: BIOGD 2810 and BIOBM 4320. S–U or letter grades. S. Lee.

For description, see BIOBM 4370.

BIOGD 4390 Molecular Basis of Human Disease (also BIOBM 4390)

Fall. 3 credits. Prerequisites: biochemistry and molecular biology (e.g., BIOBM 3300, 3310/3320, or 3330) and genetics (e.g., BIOGD 2810) or permission of instructor. Recommended: cell biology (e.g., BIOBM 4320 or BIOAP 3160) and physiology (e.g., BIOAP 3110 or 4580). S–U or letter grades. Lec. W. L. Kraus.

For description, see BIOBM 4390.

BIOGD 4400 Stem Cell Biology: Basic Science and Clinical Applications

Spring. 3 credits. Limited to 40 students. Prerequisites: BIOBM 4320 or BIOGD 3850 or permission of instructor. S–U grades by permission of instructor. Lec, disc. T. Tumber.

This course will cover basic aspects of tissue morphogenesis and homeostasis with emphasis on the biological role of embryonic and adult stem cells in development, and their possible clinical applications. The focus will be placed on mouse and human stem cells. The discussion will be structured around relevant research papers that allow more in-depth analysis of the material taught during lectures.

BIOGD 4500 Vertebrate Development

Fall. 3 credits. Prerequisites: BIOGD 2810, and either BIOBM 4320 or BIOGD 3850. S–U or letter grades. M. J. Garcia-Garcia.

This course explores the developmental mechanisms employed by vertebrate organisms. Topics include the detailed analysis of the genetic, molecular, and cellular events underlying development in frogs, fish, mice, and humans. Course readings include original research articles. Students are encouraged to participate in class discussions.

[BIOGD 4610 Development and Evolution

Spring. 3 credits. Prerequisites: BIOEE 2780, BIOGD 2810, BIOBM 3320 or 3300 or 3330. Recommended: BIOGD 3850. Lec. Offered alternate years; next offered 2010–2011. M. F. Wolfner.]

BIOGD 4810 Population Genetics

Fall. 4 credits. Prerequisite: BIOGD 2810, BIOEE 2780, or equivalents. Lec, disc. C. F. Aquadro.

Population genetics is the study of the transmission of genetic variation through time and space. This course explores how to quantify this variation, what the distribution of variation tells us about the structure of natural populations, and about the processes that lead to evolution. Topics include the diversity and measurement of genetic variation, mating and reproductive systems, selection and fitness, genetic drift, migration and population structure, mutation, multilocus models, the genetics of speciation, quantitative traits, and the maintenance of molecular variation. Emphasis is placed on DNA sequence variation and the interplay between theory and the data from experiments and natural populations. Specific case studies include the population genetic issues involved in DNA fingerprinting, personalized medicine, the genetic structure and evolution of natural and domesticated populations, and the study of adaptation at the molecular level. Examples are drawn from studies of animals, plants, and microbes.

BIOGD 4820 Human Genetics and Society

Fall. 4 credits. Limited to 24 students. Prerequisite: biological sciences majors; BIOGD 2810 and BIOBM 3300 or 3330 or 3310 and 3320. Taught occasionally. Check with Dept. of MBG for scheduling. M. Inada.

Presentation of science and technology of human genetics, plus discussion of the ethical, social, and legal implications of recent advances in the field. Topics include assisted reproductive strategies, genetic counseling, genetic screening (pre-implantation, prenatal, pre-symptomatic, carrier, and workplace), therapy for genetic diseases, human cloning, genetics and behavior, forensic uses of genetics and eugenics. Students lead discussions. There is a major writing component.

[BIOGD 4825 Molecular Biology of Plant Organelles (also BIOPL 4825)

Spring. 1 credit. Prerequisites: BIOPL 4831 or BIOGD 2810 and permission of instructor. S–U or letter grades. Offered alternate years; next offered 2010–2011. M. R. Hanson and D. B. Stern.

For description, see BIOPL 4825.]

BIOGD 4831 Concepts and Techniques in Plant Molecular Biology (also BIOPL/PLPA/PLBR 4831)

Fall. 2 credits. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. Lec. S–U or letter grades. M. Scanlon, M. Hanson, and T. Owens.

For description, see BIOPL 4831.

BIOGD 4840 Molecular Evolution

Spring. 3 credits. Prerequisites: BIOGD 2810. Lec. D. Barbash.

Explores the various processes by which DNA and protein sequences evolve over time, and how this evolution at the molecular level relates to changes in the morphology, behavior, and physiology of organisms that have occurred over time scales ranging from thousands to billions of years. After developing basic principles the course discusses the evolution and organization of genomes from microbes to higher eukaryotes, including humans, and the relationship between molecular evolution at the sequence level and the evolution of developmental pathways and systems.

BIOGD 4850 Bacterial Genetics (also BIOBI/BIOBM 4850)

Fall. 2 or 3 credits; optional 1 credit for registered students with permission of instructor to review literature. Prerequisite: BIOGD 2810. Recommended: BIOBI 2900 and BIOBM 3300 or 3310 and 3320 or 3330. J. E. Peters.

For description, see BIOBI 4850.

BIOGD 4860 Eukaryotic Genetics

Spring. 4 credits. Enrollment may be limited to 50 students. Prerequisites: BIOGD 2810, BIOBM 3300 or 3330 or 3310 and 3320. S–U or letter grades. E. Alani.

Develops fundamental skills in eukaryotic genetic analysis through lectures and by reading, analyzing, and presenting research articles. Concepts are presented within the context of a well-studied field, such as chromosome segregation. The basic tools that have been developed to study this field are used to analyze other topics such as vegetative and meiotic cell cycle control, embryonic development, pathogen resistance in plants, and human genetics.

BIOGD 4870 Human Genomics

Fall. 3 credits. Prerequisite: BIOGD 2810. Lec. A. G. Clark.

Applies fundamental concepts of transmission, population, and molecular genetics to the problem of determining the degree to which familial clustering of diseases in humans has a genetic basis. Emphasizes the role of full genome knowledge in expediting this process of gene discovery. Stresses the role of statistical inference in interpreting genomic information. Population genetics, and the central role of understanding variation in the human genome in mediating variation in disease risk, are explored in depth. Methods such as homozygosity mapping, linkage disequilibrium mapping, and admixture mapping are examined. The format is a series of lectures with classroom discussion. Assignments include a series of problem sets and a term paper.

BIOGD 4890 Mammalian Embryology (also BIOAP/BIOIMS 4890)

Spring. 3 credits. Prerequisite: introductory biology. Offered alternate years. D. M. Noden.

Examines the early formation of the mammalian body and placenta, emphasizing comparative aspects, and morphogenesis and histogenesis of each organ system.

BIOGD 4900 Manipulating the Mouse Genome (also NS 4900)

Fall. 1 credit. Course meets during first half of semester (planned R 1:25-3:20; Aug. 27-Oct. 8) and provides background information for VTBMS 7010/TOX 7010 Mouse Pathology and Transgenesis, which meets during second half. Students interested in both courses must register for them separately. Prerequisites: BIOGD 2810 and BIOBM 3300, 3320, or 3330 or NS 3200. Letter grades only. P. D. Soloway.

Functional genomic analysis has benefited enormously from experimental manipulation of the genomes of many organisms. The mouse has been the model of choice for such studies in mammals. This course explores the tools available for experimental manipulation of the mouse genome, including transgenesis, gene targeting, gene trapping, chemical mutagenesis, and cloning by nuclear transplant. Also discussed are use of recombinant inbred mice for complex trait analysis. Readings from the scientific literature focus on seminal applications of these methods.

BIOGD 4980 Teaching Experience

Fall or spring. 1-4 credits. Limited enrollment. Prerequisites: previous enrollment in course to be taught or equivalent. Note: Arts students may not count this course toward graduation but may, upon petition (one time only) to their class dean, carry fewer than 12 other credits and remain in good standing. This would affect Dean's List eligibility but not eligibility for graduating with distinction. S-U or letter grades by permission of instructor. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring.

BIOGD 6080 Epigenetics (also NS 6080)

Fall. 2 credits. Prerequisites: BIOGD 2810 and BIOBM 3300, 3320, or 3330 or NS 3200. Letter grades only. Planned W F 11:15-12:05; occasional evening meetings for student presentations. P. D. Soloway. Epigenetic effects refer to reversible alterations in chromatin structure that can stably and heritably influence gene expression. These changes include covalent modifications to DNA itself or to proteins bound to DNA as well as noncovalent remodeling of chromatin. This course examines selected epigenetic phenomena described in several eukaryotes, mechanisms regulating these effects, and their phenotypic consequences when normal regulation is lost. Reading materials are from current literature, and participation in class discussion is required.

BIOGD 6100 Genomes as Chromosomes

Fall. 3 credits. Limited to 15 students. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3330 or 3310/3320 or equivalent by permission of instructor. Letter grades only. Offered alternate years. T. P. O'Brien and P. E. Cohen.

The eukaryotic genome is partitioned into discrete structural units, the chromosomes. The course examines how chromosome

organization is related to chromatin structure, gene expression, DNA replication, repair, and stability. Special emphasis is placed on how the linear arrangement of sequence features along the chromosome, such as genes and regulatory modules, relate to the functional organization of the genome in the nucleus. Experimental and computational approaches used to address chromosome structure and function are studied.

BIOGD 6110 Genome Maintenance Mechanisms

Fall. 1 credit. Meets only during first half of semester. Limited to 25 students. Prerequisites: BIOGD 2810, as well as BIOBM 3300, or 3330, or 3310/3320 (or equivalents). S-U or letter grades. R. Weiss.

The course focuses on the molecular mechanisms utilized by eukaryotic cells to preserve genomic integrity. Topics to be discussed include endogenous and exogenous sources of mutation, DNA repair pathways, and cell cycle checkpoint mechanisms. Also addressed will be how genome maintenance impacts genome plasticity and evolution, as well as the relationship between genomic instability and disease, especially cancer.

BIOGD 6120 Overview of Model Genetic Organisms

Spring, 2nd 6 weeks of semester. 1 credit. Limited to 20 students. Prerequisites: BIOGD 2810 or 4000 or permission of instructor. S-U or letter grades. Offered alternate years. J. Schimenti and staff.

Presents the features of various model organisms and their relative merits for conducting various types of genomics/genetics research. Model systems discussed include yeast, *Arabidopsis*, *Drosophila*, *C. elegans*, zebrafish, and mice.

BIOGD 6130 Genomics and Society

Spring, weeks 10-13. 1 credit. Prerequisite: BIOGD 2810 or BIOGD 4000 or permission of instructor. S-U or letter grades. Disc. S. Kresovich and S. Tanksley.

A multidisciplinary examination of four to six selected topics that relate to the applications of biological insights derived from genomic analysis. Technical, scientific, ethical, political, legal, and/or social aspects of each topic will be considered from various perspectives.

BIOGD 6200 Evolutionary Genomics of Bacteria

Spring. 1 credit. M. Stanhope. Comparative genomics of bacteria is a valuable approach to deriving information on pathogenesis, antibiotic resistance, host adaptation, and genome evolution. This course provides an evolutionary perspective on comparative bacterial genomics, focusing in particular on pathogens of human and agricultural importance. The course will include lectures, discussion of relevant scientific literature, and a bioinformatics session.

BIOGD 6380 Filamentous Fungal Genomics and Development (also PLPA 6380)

Spring, last four weeks of semester. 1 credit. Prerequisite: BIOGD 2810 or equivalent, or permission of instructor. S-U or letter grades. Lec. Offered alternate years. B. G. Turgeon.

For description, see PLPA 6380.

BIOGD 6820 Fertilization and the Early Embryo

Spring. 2 credits. Prerequisites: BIOGD 2810; BIOBM 3320, 3300 or 3330; and BIOGD 3850 or permission of instructor. Lec. Offered alternate years. M. F. Wolfner. We explore the latest molecular/cell/genetic findings about the biology of gametes, fertilization, and early development—and their application to fertility modulation, “cloning,” and stem cells.

[BIOGD 6870 Developmental Genetics

Fall. 2 credits. Limited to 20 students. Prerequisites: BIOGD 2810 and 3850 or equivalents. S-U or letter grades. Lec TBA. Offered alternate years; next offered 2010-2011. K. J. Kemphues. Course focuses on methods of genetic analysis of fruitflies, nematodes, mice, and fish to understand mechanisms of development. No text. Lectures and problems from literature.]

[BIOGD 6890 Cellular Basis of Development

Fall. 2 credits. Limited to 20 students. Prerequisites: BIOGD 2810, 3850, and either BIOBM 3300 or 3310-3320. Lec. S-U or letter grades. Next offered 2010-2011. J. Liu. Focuses on the integration of different cellular processes in various developmental contexts. Topics include cell polarity, cell migration, cell adhesion and fusion, cell growth and proliferation, cell-cell communication, and cell death. Students are required to read current literature and participate in discussions in class.]

BIOGD 7800 Current Topics in Genetics and Development

Fall and spring. 1 credit; may be repeated for credit. Limited to 20 students. Primarily for graduate students; priority given to majors in field of genetics. Prerequisite: for undergraduates, written permission of instructor. No auditors. S-U grades only. Staff.

BIOGD 7810 Problems in Genetics and Development

Fall. 2 credits. Prerequisite: first-year graduate students in field of genetics and development. Disc TBA. Staff. Introduction to the research literature in selected areas through weekly problem sets and discussions.

BIOGD 7820 Current Genetics/Development Topics

Spring. 0.5 or 1 credit for each topic; may be repeated for credit. S-U grades only. Lec and sem on specialized topics. Staff.

BIOGD 7840 Introduction to Quantitative Analysis

Fall. 1 credit. Letter grades only. M. L. Goldberg. The goal of this course is to introduce bioinformatic and probability/statistical tools at an intuitive level that will be meaningful to first-year graduate students in Genetics and Development.

BIOGD 7860 Research Seminar in Genetics and Development

Fall and spring. 1 credit. Requirement for, and limited to second-year and beyond graduate students in genetics and development. S-U grades only. Staff. Each graduate student presents one seminar per year based on his or her thesis research. The student then meets with the thesis

committee members for an evaluation of the presentation.

BIOD 7870 Seminar in Genetics and Development

Fall and spring. 1 credit. Prerequisite: graduate students in Genetics and Development. S–U grades only. Sem, TBA. Staff.

Seminars in current research in genetics and developmental biology conducted by distinguished visitors and staff.

Related Courses in Other Departments

Advanced Plant Genetics (PLBR 6060)

Biosynthesis of Macromolecules (BIOBM 6330)

Concepts and Techniques in Plant Molecular Biology (BIOPL 4831)

Current Topics in Biochemistry (BIOBM 7940)

Evolutionary Biology (BIOEE 2780)

Laboratory in Molecular Biology and Genetic Engineering of Plants (BIOPL 3431)

Laboratory in Plant Molecular Biology (BIOPL 6410)

Light Signal Transduction in Plants (BIOPL 4829)

Molecular Aspects of Plant Development (BIOPL 4834)

Molecular Biology and Genetic Engineering of Plants (BIOPL 3430)

Molecular Biology of Plant Organelles (BIOPL 4825)

Molecular Breeding (BIOPL 4835)

Molecular Plant-Microbe Interactions (BIOPL 4823)

Molecular Plant-Pathogen Interactions I and II (BIOPL 4821–4822)

Plant Biotechnology (BIOPL 4826)

Plant Cell Walls: Structure to Proteome (BIOPL 4827)

Plant Cytogenetics (PLBR 4460)

Plant Gene Evolution and Phylogeny (BIOPL 4824)

Plant Genome Organization (PLBR/BIOPL 4833)

Plant Senescence (BIOPL 4836)

Proteomics in Plant Biology (BIOPL 4832)

The Nucleus (BIOBM 6390)

Undergraduate Research in Biology (BIOG 4990)

Molecular Neurobiology BIONB 4200/7200 (also BIOBM 4350/7940)

Introduction to Research Methods in Biology (BIOG 2990)

MICROBIOLOGY (BIOMI)

BIOMI 1120 Microbes, the Earth, and Everything (also CSS 1120)

Fall. 3 credits. D. Buckley and E. Angert. For description, see CSS 1120.

BIOMI 1250 Biology Seminar

Fall and spring. 1 credit. Prerequisite: first-year standing or permission of instructor. S–U grades only. Staff.

A first-year seminar designed for students with Biology AP credit or a strong interest in research. Students will interact with faculty while learning to read and evaluate scientific publications on current biological topics. Multiple topics and sections will be offered each semester.

BIOMI 1720 Bioscientific Terminology (also CLASS 1692)

Summer and winter. 3 credits. Letter grades only.

For description, see CLASS 1692.

BIOMI 2900 General Microbiology Lectures

Fall, spring, or summer (six-week session). 3 credits. Prerequisites: one year introductory biology for majors and one year college chemistry, or equivalent. Highly recommended: concurrent registration in BIOMI 2910. W. C. Ghiorse.

Comprehensive overview of the biology of microorganisms, with emphasis on bacteria. Topics include microbial cell structure and function, physiology, metabolism, genetics, diversity, and ecology. Also covers applied aspects of microbiology such as biotechnology, the role of microorganisms in environmental processes, and medical microbiology. 4-credit option involves one discussion per week led by faculty in the Department of Microbiology and will involve readings and a writing assignment. Students may not pre-register for 4-credit option: Interested students complete an application form on first day of class (enrollment will be limited to 20 students).

BIOMI 2910 General Microbiology Laboratory

Summer (six-week session). 2 credits. Pre- or corequisite: BIOMI 2900. S. M. Merkel. Study of the basic principles and techniques of laboratory practice in microbiology, and fundamentals necessary for further work in the subject.

BIOMI 2911 General Microbiology Laboratory

Fall or spring. 2 credits. Pre- or corequisite: BIOMI 2900. S. M. Merkel.

Study of the basic principles and techniques of laboratory practice in microbiology, and fundamentals necessary for further work in the subject.

BIOMI 2920 General Microbiology Discussion

Spring. 1 credit. Pre- or corequisite: BIOMI 2900. S–U grades only. Staff.

Series of discussion groups in specialized areas of microbiology to complement BIOMI 2900.

BIOMI 3080 Field Microbial Ecology (also BIOSM 3080)

Summer. 4 credits.

For description, see BIOSM 3080.

BIOMI 3310 General Parasitology (also BIOMS 3310)

Spring. 2 credits. Prerequisites: zoology or biology course; any of the following: BIOEE 2610, 2640, 2670, 2740, 2780; NS 2750; EAS 1700; BIOG 1101, 1102, 1103, 1104, 1106, 1107, 1108, 1109, 1110; BIOMI 2900, or equivalent courses. Letter grades only. D. D. Bowman.

For description, see BIOMS 3310.

BIOMI 3910 Advanced Microbiology Laboratory

Fall. 3 credits. Prerequisites: BIOMI 2900, 2910, and BIOBM 3300 or 3310 or 3330. Priority given to biological sciences students in microbiology program of study. E. R. Angert, J. P. Shapleigh, and S. H. Zinder.

An introduction to advanced experimental methods in microbiology. Students will gain experience with a variety of cutting-edge technologies used to characterize genetic, physiological, and structural aspects of microbes. These skills will be utilized during the isolation and characterization of bacteria isolated from diverse habitats as well as during isolation of mutants of an environmental isolate.

BIOMI 3940 Applied and Food Microbiology (also FDSC 3940)

Fall. 2–3 credits. Prerequisites: BIOMI 2900–2910. C. A. Batt.

For description, see FDSC 3940.

BIOMI 3970 Environmental Microbiology (also CSS 3970)

Spring. 3 credits. Prerequisites: BIOMI 2900. Recommended: BIOEE 2610, NTRES 3030, or permission of instructor. Offered alternate even-numbered years. E. L. Madsen.

Discusses the biological properties, evolution, and behavior of microorganisms in natural systems in relation to past and present environmental conditions on Earth. Also considers the functional role of microorganisms in ecologically and environmentally significant processes through discussion of specific topics such as nutrient and toxic elemental cycles, transformation of pollutant chemicals, wastewater treatment, environmental biotechnology, and astrobiology.

BIOMI 4040 Pathogenic Bacteriology (also BIOMS 4040)

Spring. 2 or 3 credits; 3 credits with lec and sem. Seminar required for graduate students. Maximum enrollment for seminar portion 15. Prerequisites: BIOMI 2900 and 2910; for undergraduates, permission of instructor. Highly recommended: BIOG 3050. Offered alternate even years. Letter grades only. D. Debbie.

For description, see BIOMS 4040.

BIOMI 4090 Principles of Virology (also BIOMS/PLPA 4090)

Fall. 3 credits. Prerequisites: BIOMI 2900, 2910 or permission of instructor. Recommended: BIOBM 3300–3320, 4320. Letter grades only. S. G. Lazarowitz, N. Osterrieder, and J. Parker.

For description, see BIOMS 4090.

[BIOMI 4140 Prokaryotic Diversity

Spring. 3 credits. Prerequisites: BIOMI 2900 and 2910. Recommended: BIOBM 3300 or 3310 or 3330. Offered alternate odd-numbered years; next offered 2010–2011. S. H. Zinder.

Consideration of the evolutionary biology, physiology, ecology, genetics, and practical potential of important groups of prokaryotes. Topics include prokaryotic phylogeny, the evolution of diverse mechanisms of energy conservation, fixation of carbon and nitrogen, and adaptation to extreme environments.]

BIOMI 4160 Bacterial Physiology

Spring, 3 credits. Prerequisites: BIOMI 2900, 2910, and BIOBM 3300 or 3310, or equivalents. Offered alternate even years. J. P. Shapleigh.

Course will cover the basic structures and metabolic processes common to most bacteria. Emphasis will be on structural organization of bacteria and understanding physiological adaptations to different growth conditions.

[BIOMI 4180 Microbial Ecology

Spring, 3 credits. Prerequisites: BIOMI 2900 and 2910, or 3970 and permission of instructor, and BIOBM 3300 or 3310 and 3320. Next offered 2010–2011. E. R. Angert. Understanding the role of microorganisms in natural environments is one of the greatest challenges facing microbiologists. This course introduces current methods to assess community diversity in a variety of ecosystems.]

[BIOMI 4200 Microbial Genomics

Spring, 2 credits. Prerequisites: BIOMI 2900, BIOGD 2810, BIOBM 3300, or equivalent. Offered alternate odd-numbered years; next offered 2010–2011. J. P. Shapleigh and J. D. Helmann. Genomic information is revolutionizing biology. This course discusses the impact of genomic information on the study of microbial physiology, evolution, and biotechnology. Topics include both techniques (automated DNA sequencing, assembly, annotation, DNA chips) and applications (genome-wide analysis of transcription, functional genomics).]

BIOMI 4310 Medical Parasitology (also BIOMS 4310)

Fall, 2 credits. Prerequisites: zoology or biology course; any of the following: BIOEE 2070, 2610, 2630, 2640, 2670, 2740, 2780; NS 2750; BIOG 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110; BIOMI 2900, 3970; EAS 1700 or equivalent course. Letter grades only. D. D. Bowman. For description, see BIOMS 4310.

BIOMI 4480 Symbiotic Associations: Evolution and Ecology (also PLPA 4480)

Spring, 3 credits. Prerequisites: two semesters of introductory biology (BIOG 1101–1102, BIOG 1105–1106, BIOG 1107–1108, or BIOG 1109–1110), and BIOMI 2900 or permission of instructor. Letter grades only. T. E. Pawlowska. For description, see PLPA 4480.

BIOMI 4823 Molecular Plant-Microbe Interactions (also BIOPL/PLPA 4823)

Spring, 1 credit. Prerequisites: BIOGD 2810, BIOBM 3300 or 3310 or 3330, and BIOPL 4830 or equivalents. S–U or letter grades. Offered alternate even years. S. C. Winans.

For description, see BIOPL 4823.

BIOMI 4850 Bacterial Genetics (also BIOGD/BIOBM 4850)

Fall, 2 or 3 credits; optional 1 credit for registered students with permission of instructor to review literature. Prerequisite: BIOGD 2810. Recommended: BIOMI 2900 and BIOBM 3300 or 3310 and 3320 or 3330. J. E. Peters.

Students gain a detailed understanding of how bacteria maintain and pass on genetic information with a strong focus on the bacterium *Escherichia coli*. They discover the processes by which bacteria evolve through different mutations and the exchange of genetic information. The course explores how genes are regulated efficiently through negative and positive regulation and by global regulatory mechanisms. Upon completion of the course students should understand the tools used to manipulate bacterial genomes for the understanding of bacteria and other living organisms.

BIOMI 4980 Teaching Experience

Fall or spring, 1–4 credits. Limited enrollment. Prerequisites: previous enrollment in course to be taught or equivalent. Note: Arts students may not count this course toward graduation but may, upon petition (one time only) to their class dean, carry fewer than 12 other credits and remain in good standing. This would affect Dean's List eligibility but not eligibility for graduating with distinction. S–U or letter grades by permission of the instructor. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring.

[BIOMI 6080 Genomics of Bacterium-Host Interactions (also PLPA 6080)

Fall, second half of semester, 1 credit. Prerequisites: BIOMI 2900 or equivalent or permission of instructor. S–U or letter grades. Offered alternate even years; next offered 2010–2011. A. Collmer and S. Winans.

For description, see PLPA 6080.]

[BIOMI 6100 Introduction to Chemical and Environmental Toxicology (also TOX 6100)

Fall, 3 credits. Prerequisite: graduate standing in field or permission of instructor. Letter grades. Offered alternate years; next offered 2010–2011. A. Hay.

Introduction to the general principles of toxicology including the sources, mechanisms, and targets of toxic agents. Gives special attention to the interaction between toxic agents and biological systems at both the organismal and ecological level. The effects of both anthropogenic and natural toxins are examined with respect to genetic and developmental toxicity as well as carcinogenesis and specific organ toxicity.]

BIOMI 6430 Veterinary Perspectives on Pathogen Control in Animal Manure (also VTMED/BEE 6430)

Spring, eight weeks, 2 credits. Prerequisite: third- and fourth-year veterinary students. Letter grades only. D. D. Bowman.

For description, see VTMED 6430.

BIOMI 6901 Prokaryotic Biology: Microbial Structure and Function

Fall, 4 weeks/8 lec. 1 credit. J. P. Shapleigh. Discusses those macromolecules and assemblages of macromolecules that together define the structure of the prokaryotic cell. This includes external structures, such as cell wall, flagella, pili, and peptidoglycan and internal structures such as specialized vesicles and other large complexes.

BIOMI 6902 Prokaryotic Biology: Environmental Microbiology

Fall, 4 weeks/8 lec. 1 credit. E. L. Madsen. Core course of concepts, methods, and current literature that reveals the multidisciplinary nature of environmental microbiology and its relationship to prokaryotic biology. Discusses the crucial roles that microorganisms play in catalyzing biogeochemical reactions throughout the biosphere.

BIOMI 6903 Prokaryotic Biology: Microbial Physiology/Diversity

Fall, 4 weeks/8 lec. 1 credit. S. H. Zinder. Reviews the major energy-conserving modes of metabolism and their phylogenetic distributions among both bacteria and archaea. Topics include phylogenetic analysis, fermentation, respiration, photosynthesis, pathways of carbon and nitrogen fixation, and evolution of the three domains of life.

BIOMI 6904 Prokaryotic Biology: Microbial Genetics

Spring, 4 weeks/8 lec. 1 credit. J. D. Helmann.

Reviews the fundamental concepts of microbial genetics including mutations and their analysis, plasmids, conjugation, transformation, transduction, transposition, recombination, repair, and mutagenesis.

BIOMI 6905 Prokaryotic Biology: Microbial Pathogenesis

Spring, 4 weeks/8 lec. 1 credit. S. C. Winans.

Introduction to the fundamental concepts of bacterial pathogenesis including the normal flora, pathogen entry and colonization, the production and regulation of toxins, horizontal transfer of pathogenesis determinants, and the roles of both specific and nonspecific host defenses. Examples include bacterial pathogens of both animals and plants.

BIOMI 6990 Toxicology Journal Club Sec 01—Environmental Toxicology (TOX 6990)

Spring, 1 credit. Required for toxicology students until post A exam. A. G. Hay.

BIOMI 7250 Mechanisms of Microbial Pathogenesis (also VETMI 7250)

Spring, 3 credits. Prerequisites: for undergraduates, written permission of instructor; BIOMI 4040, 4090, or equivalent. Highly recommended: completion of two of the three courses. D. Debbie, M. Hesse, H. Marquis, J. Parker, M. Scidmore, and G. Whittaker. For description, see VETMI 7250.

BIOMI 7910 Advanced Topics in Microbiology

Fall or spring, 1 credit; may be repeated for credit. Prerequisite: graduate standing in microbiology. S–U grades only. E. R. Angert.

Reading and presentation by graduate students of current literature in selected areas of modern microbiology.

BIOMI 7960 Current Topics in Microbiology

Fall and spring, 0.5 or 1 credit for each topic; may be repeated for credit. Primarily for graduate students in microbiology.

Prerequisite: upper-level courses in microbiology. S–U grades only. Lec. Staff.

Lectures and seminars on special topics in microbiology.

BIOMI 7970 Scientific Communication Skills

Fall and spring, 1 credit each semester. Requirement for graduate students in graduate field of microbiology for first two semesters; third semester optional. S–U grades only. Staff.

The ability to communicate effectively is essential for success as a scientist. The primary goal of this course is to provide students with an opportunity to develop self-confidence and refine their formal oral presentation skills. Students are asked to present topical seminars that are critically evaluated by the instructor. Feedback for improving the presentation and peer evaluations are emphasized.

BIOMI 7980 Graduate Research Seminar in Microbiology

Fall and spring, 1 credit each semester. Requirement for graduate students in graduate field of microbiology. S–U grades only. Staff.

All graduate students in the field of microbiology are required to attend and present a seminar concerning their research at least once each year.

BIOMI 7990 Microbiology Seminar

Fall and spring. Requirement for all graduate students in graduate field of microbiology. Open to all who are interested. Staff.

Related Courses in Other Departments

Advanced Food Microbiology (FDSC 6070)

Advanced Immunology Lectures (VETMI/BIOMS 7050)

Advanced Work in Bacteriology, Virology, or Immunology (VETMI 7070)

Applied and Food Microbiology, Lectures (FDSC 3940)

Basic Immunology, Lectures (BIOMS 3150)

Current Topics in Oomycete Biology (PLPA 6440)

Food Microbiology, Laboratory (FDSC 3950)

Immunology of Infectious Diseases (VETMI/BIOMS 7190)

Introduction to Scanning Electron Microscopy (BIOP 4010)

Fungi (PLPA 3090)

Light and Video Microscopy for Biologists (BIOP 4500)

Limnology: Ecology of Lakes, Lectures (BIOEE 4570)

Magical Mushrooms, Mischievous Molds (PLPA 2010)

Microbiology for Environmental Engineering (CEE 4510)

Plant Virology (PLPA 6450)

Principles of Biogeochemistry (BIOEE 6680)

MEDICAL SCIENCE (BIOMS)**[BIOMS 2140 The Biological Basis of Sex Differences (also BSOC 2141, BIOAP/FGSS 2140)]**

Fall, 3 credits. Prerequisite: one year introductory biology. S–U or letter grades. Offered alternate years; next offered 2010–2011. J. E. Fortune.

For description, see BIOAP 2140.]

BIOMS 3110 Introductory Animal Physiology (also BIOAP 3110, VTBMS 3460)

Fall, 3 credits. Prerequisites: one year college biology, chemistry, and mathematics. Recommended: previous or concurrent physics course. S–U or letter grades by permission of instructor. Evening prelims. E. R. Loew.

For description, see BIOAP 3110.

BIOMS 3150 Basic Immunology

Fall, 3 credits. Highly recommended: basic courses in microbiology, genetics, and biochemistry. S–U or letter grades.

J. A. Appleton.

Survey of immunology, with emphasis on the cellular and molecular bases of the immune response.

BIOMS 3160 Cellular Physiology (also BIOAP 3160)

Spring, 3 credits. Pre- or corequisite: BIOBM 3300 or 3310 and 3320 or 3330. Letter grades only. Evening prelims.

A. Quaroni.

For description, see BIOAP 3160.

BIOMS 3190 Animal Physiology Experimentation (also BIOAP 3190)

Fall, 4 credits. Prerequisite: BIOAP 3110 or permission of instructor. For pre-med, pre-vet juniors and seniors, and graduate students interested in biomedical science. Letter grades only. E. R. Loew, N. A. Lorr, and staff.

For description, see BIOAP 3190.

BIOMS 3310 General Parasitology (also BIOMI 3310)

Spring, 2 credits. Prerequisites: zoology or biology course; any of the following: BIOEE 2610, 2640, 2670, 2740, 2780; NS 2750; EAS 1700; BIOG 1101, 1102, 1103, 1104, 1106, 1107, 1108, 1109, 1110; BIOMI 2900, or equivalent courses. Letter grades only. D. D. Bowman.

This course is an introduction to the basic animal parasites, stressing systematics, taxonomy, general biology, ecological interactions, and behavior of non-medically important groups. Introduces the major animal parasite groups: protozoan, nematode, platyhelminth, acanthocephalan, annelid, and arthropod.

BIOMS 4040 Pathogenic Bacteriology (also BIOMI 4040)

Spring, 2 or 3 credits; 3 credits with lec and sem. Seminar required for graduate students. Maximum enrollment for seminar portion 15. Prerequisites: BIOMI 2900 and 2910. Letter grades only. D. P. Debbie.

Course in medical microbiology, presenting the major groups of bacterial and mycotic pathogens important to human and veterinary

medicine. Emphasizes infection and disease pathogenesis. Topics include disease causality; interactions of host, pathogen, and environment, including immunity to bacteria; and principles of antimicrobial therapy and drug resistance. A companion seminar addresses the current and classic literature related to microbial pathophysiology on the cellular and molecular levels.

BIOMS 4090 Principles of Virology (also BIOMI/PLPA 4090)

Fall, 3 credits. Prerequisites: BIOMI 2900 and 2910 or permission of instructor.

Recommended: BIOBM 3300–3320, 4320. S. Lazarowitz, N. Osterrieder, and J. Parker.

Covers the principles of virology, focusing mainly on animal viruses but also including plant viruses and bacteriophage. Topics include the classification of viruses, virus entry, genome replication and assembly, and virus pathogenesis. Particular emphasis is placed on virus–host cell interactions and common features between different viral families.

BIOMS 4130 Histology: The Biology of the Tissues (also BIOAP 4130)

Spring, 4 credits. Prerequisite: one year introductory biology. Recommended:

BIOBM 3300 or 3310, or equivalent. S–U or letter grades. S. Suarez and L. Mizer.

For description, see BIOAP 4130.

BIOMS 4160 Cell Physiology and Genomics Laboratory (also BIOAP 4160)

Spring, 4 credits. Limited to 24 students.

Pre- or corequisite: BIOAP 3160 or BIOBM 4320 or permission of instructor. For pre-med, pre-vet, juniors, seniors, and graduate students interested in biomedical science. Letter grades only. H.–H. Chuang, N. A. Lorr, and staff.

For description, see BIOAP 4160.

BIOMS 4310 Medical Parasitology (also BIOMI 4310)

Fall, 2 credits. Prerequisites: zoology or biology course; any of the following: BIOEE 2070, 2610, 2630, 2640, 2670, 2740, 2780; NS 2750; BIOG 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110; BIOMI 2900, 3970; EAS 1700 or equivalent course. Letter grades only. D. D. Bowman.

Systematic study of arthropod, protozoan, and helminth parasites of public health importance, with emphasis on epidemiologic, clinical, and zoonotic aspects of these parasitisms.

BIOMS 4580 Mammalian Physiology (also BIOAP 4580)

Spring, 3 credits. Auditors allowed.

Prerequisite: BIOAP 3110 or equivalent.

Recommended for biological sciences majors, pre-med and pre-vet students, and beginning graduate students in physiology, nutrition, and animal science. Letter grades only. Evening prelims. K. W. Beyenbach.

For description, see BIOAP 4580.

BIOMS 4750 Mechanisms Underlying Mammalian Developmental Defects (also BIOAP/NS 4750)

Spring, 3 credits. Prerequisites: BIOBM 3300, 3310–3320, or 3330 (may be taken concurrently). S–U or letter grades. Offered alternate years. D. Noden and P. Stover.

For description, see BIOAP 4750.

BIOMS 4890 Mammalian Embryology (also BIOAP/BIOGD 4890)

Spring. 3 credits. Prerequisite: introductory biology. S-U or letter grades. Evening prelims. Offered alternate years. D. M. Noden.

For description, see BIOAP 4890.

BIOMS 7050 Advanced Immunology (also VETMI 7050)

Spring. 3 credits. Prerequisite: basic immunology course or permission of instructor. Letter grades only. Offered even-numbered years. C. Leifer and staff.

For description, see VETMI 7050.

[BIOMS 7190 Immunology of Infectious Diseases (also VETMI 7190)]

Spring. 2 credits. Prerequisite: basic immunology course or permission of instructor. S-U or letter grades. Offered odd-numbered years; next offered 2010-2011. M. Bynoe and staff.

For description, see VETMI 7190.]

NEUROBIOLOGY AND BEHAVIOR (BIONB)**BIONB 1110 Brain Mind and Behavior (also PSYCH/COGST 1110)**

Spring. 3 credits. Prerequisite: none. Intended for freshmen and sophomores in humanities and social sciences; not open to juniors and seniors. Not recommended for psychology majors; biology majors may not use for credit toward major. Letter grades only. Planned M W F 9:05. E. Adkins-Regan and R. R. Hoy.

For description, see COGST 1110.

[BIONB 1220 FWS: Special Topics in Neurobiology and Behavior]

Fall and spring. 3 credits. Prerequisite: permission of Knight Writing Program; freshman standing. Letter grades only. Staff.

For description, see John S. Knight Institute for Writing in the Disciplines. First-Year Writing Seminars.]

BIONB 1250 Biology Seminar

Fall and spring. 1 credit. Prerequisite: first-year standing or permission of instructor. S-U grades only. Staff.

A first-year seminar designed for students with Biology AP credit or a strong interest in research. Students will interact with faculty while learning to read and evaluate scientific publications on current biological topics. Multiple topics and sections will be offered each semester.

BIONB 2210 Neurobiology and Behavior I: Introduction to Behavior

Fall. 3, 4, or 5 credits; 4 credits with one disc per week; 5 credits with two disc per week and participation in Writing in the Majors program; 4- or 5-credit option required of students in neurobiology and behavior program of study. Limited to 15 students per 4-credit disc. Priority given to students studying neurobiology and behavior. Limited to 12 students in 5-credit option (students may not preregister for 5-credit option; interested students complete application form on first day of class). Not open to freshmen. Prerequisite: one year introductory biology for majors. May be taken independently of BIONB 2220. S-U or letter grades. Planned M W F 12:20; disc TBA. K. L. Shaw and staff.

General introduction to the field of animal behavior. Topics include evolution and behavior, behavioral ecology, sociobiology, chemical ecology, communication, orientation and navigation, and hormonal mechanisms of behavior.

BIONB 2213 Neurobiology and Behavior I: Introduction to Behavior

Summer, six-week session. 3 or 4 credits; 4 credits with one disc per week. Limited to 30 students. Prerequisite: one year introductory college biology. S-U or letter grades. Course fee: none. Planned M-F TBA. Staff.

General introduction to the field of animal behavior. Topics include evolution and behavior via natural selection, genes and behavior, behavioral ecology, sociobiology, communication, cognition, hormonal mechanisms of behavior, and topics in Darwinian medicine.

BIONB 2220 Neurobiology and Behavior II: Introduction to Neurobiology

Spring. 3, 4, or 5 credits; 4 credits with one disc per week and written projects; 5 credits with two disc per week and participation in Writing in the Majors program; 4- or 5-credit option required of students in neurobiology and behavior program of study. Limited to 15 students per 4-credit disc. Priority given to students studying neurobiology and behavior. Limited to 12 students in 5-credit option (students may not preregister for 5-credit option; interested students complete application form on first day of class). Not open to freshmen. Prerequisite: one year introductory biology for majors and one year of chemistry. May be taken independently of BIONB 2210. S-U or letter grades. Planned M W F 12:20; disc TBA. Staff.

General introduction to the field of cellular and integrative neurobiology. Topics include neural systems, neuroanatomy, developmental neurobiology, electrical properties of nerve cells, synaptic mechanisms, neurochemistry, motor systems, sensory systems, learning, and memory. Some discussion sections include dissections of preserved brains.

[BIONB 3220 Hormones and Behavior (also PSYCH 3220/7220)]

Fall. 3 credits. Limited to 60 students. Prerequisites: junior or senior standing; any one of the following: PSYCH 2230 or BIONB 2210 or 2220 or one year introductory biology plus psychology course. Two lec plus sec in which students read and discuss original papers in the field, give oral presentation, and write term paper. Letter grades only. Graduate students, see PSYCH 7220. Planned M W F 11:15. Next offered 2010-2011. E. Adkins-Regan.

For description, see PSYCH 3220.]

[BIONB 3230 Methods in Animal Behavior]

Fall. 4 credits. Limited to 24 students. Prerequisite: BIONB 2210. Letter grades only. Offered alternate years; next offered 2010-2011. Planned M W 1:25-4:25. Staff.

Hands-on lab/field course in methods for studying animal behavior. Topics include sound recording, videography radio-tracking, mapping, capture/marketing methods, and behavioral statistics.]

BIONB 3240 Biopsychology Laboratory (also PSYCH 3240)

Fall. 4 credits. Limited to 20 students. Prerequisites: junior or senior standing; PSYCH 2230 or BIONB 2210 or 2220, and permission of instructor. Planned T R 1:25-4:25. Letter grades only. T. J. DeVoogd.

For description, see PSYCH 3240.

[BIONB 3250 Insect Behavior (also ENTOM 3250)]

Spring. 3 credits. Limited to 50 students. Prerequisite: ENTOM 2120 or BIONB 2210. Intended for juniors, seniors, and beginning graduate students. S-U or letter grades. Planned T R 10:10-11:25. Offered alternate years; next offered 2010-2011. L. S. Rayor.

For description, see ENTOM 3250.]

BIONB 3280 Biopsychology of Learning and Memory (also PSYCH 3320/6320)

Spring. 3 credits. Limited to 65 students. Prerequisites: one year of biology and either a biopsychology course or BIONB 2220. S-U or letter grades. Graduate students, see PSYCH 6320. Planned M W F 11:15. T. J. DeVoogd.

For description, see PSYCH 3320.

BIONB 3290 Ecology of Animal Behavior (also BIOSM 3290)

Summer. 4 credits. Limited to 18 students. Prerequisite: one year introductory college biology. Recommended: ecology, psychology, or behavior course. S-U or letter grades. Special two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. For more details and an application, contact SML office, G14 Stimson Hall. Daily lec, lab, and fieldwork for two weeks. SML faculty.

For description, see BIOSM 3290.

[BIONB 3300 Introduction to Computational Neuroscience (also PSYCH/COGST/BME 3300)]

Fall. 3 or 4 credits; 4 credits includes lab providing additional computer simulation exercises. Prerequisites: BIONB 2220 or permission of instructor. S-U or letter grades. Offered alternate years; next offered 2010-2011. Planned M W 2:55-4:10, lab TBA. C. Linster.

Covers the basic ideas and techniques involved in computational neuroscience. Surveys neural dynamics of networks of cells, neural coding, learning, memory models, sensory coding.]

BIONB 3310 Human Social Behavior and Evolution

Spring. 3 credits. Limited to 100 students. Prerequisite: BIONB 2210 or permission of instructor. S-U or letter grades. Planned M W 2:55-4:10. P. Barclay.

Lecture-based course drawing on research in evolutionary biology and animal behavior to investigate various aspects of human social behavior. Findings are presented from areas such as evolutionary psychology, anthropology, human behavioral ecology, and evolutionary game theory. Topics may vary slightly from year to year, but include mating, cooperation (with kin and nonkin), conflict and aggression, parental behavior, costly signaling, and culture.

[BIONB 3400 Animal Orientation and Navigation]

Spring. 2 credits. Pre- or corequisite: BIONB 2210 and BIONB 2220 or permission of instructor. S-U or letter grades. Planned: T R 9:05. Offered alternate years; next offered 2011–2012. K. Adler.

In-depth coverage of the topic, including sensory cues and receptors, physiological basis, ecological context, and evolutionary aspects, with emphasis on current research.]

[BIONB 3690 Chemical Ecology (also BIOEE/ENTOM 3690)]

Spring. 3 credits. Prerequisites: one semester of introductory biology for majors or nonmajors and one semester of introductory chemistry for majors or nonmajors or equivalents, or permission of instructor. S-U or letter grades. Planned M W F 11:15. J. Thaler, A. Kessler, A. Agrawal, and R. Raguso.

For description, see BIOEE 3690.

[BIONB 3920 Drugs and the Brain]

Fall. 4 credits. Limited to 90 students. Prerequisites: BIONB 2220 or equivalent course in neurobiology by permission of instructor. Recommended: knowledge of biochemistry. S-U or letter grades. Planned T R 10:10–11:25; disc TBA. Offered alternate years. R. M. Harris-Warrick.

Introduction to neuropharmacology, with an emphasis on the neural mechanisms of psychoactive drugs. Topics include a brief introduction to neuropharmacology and a discussion of the major neurotransmitter families. The rest of the course covers the major psychoactive drugs, including cocaine, heroin, psychedelics, marijuana, and alcohol, as well as pharmaceuticals for the treatment of anxiety, schizophrenia, and depression. Includes a term paper in the form of a grant proposal to study a current problem in neuropharmacology.

[BIONB 3940 Circadian Rhythms (also BIOGD/ENTOM/PLPA 3940)]

Fall. 2 or 3 credits (for optional lab see PLPA 3941). Prerequisite: 2000-level biology course. S-U or letter grades. Planned T R 10:10–11; additional lab R 1:25–4:25 for 3-cr. option. K. Lee.

For description, see PLPA 3940.

[BIONB 3960 Introduction to Sensory Systems (also PSYCH 3960/6960)]

Spring. 4 credits. Limited to 25 students. Prerequisites: introductory biology or biopsychology, plus second course in behavior, biopsychology, cognitive science, neuroscience, or perception; knowledge of elementary physics, chemistry, and behavior. S-U or letter grades. Planned T R 10:10–11:25. Offered alternate years; next offered 2010–2011. B. P. Halpern.

For description, see PSYCH 3960.]

[BIONB 4130 Molecules of Social Behavior and Emotion]

Spring. 3 credits. Limited to 25 students. Prerequisite: permission of instructor. Letter grades only. Planned T R 10:10–11:25. Offered alternate years. D. P. McCobb.

Active-learning course with specific topics to be determined by students. Focuses on molecular, neural, and endocrine mechanisms underlying innate and learned behavior patterns, and their relationship to social, ecological, and evolutionary context. Neurotransmitters, hormones and receptors governing such behaviors as parental care,

territoriality, cooperativity, courtship, and stress responses are examples of topics of interest. Format includes library research, oral and written presentations, teamwork, and peer review.

[BIONB 4200 Topics in Neurobiology and Behavior]

Fall and spring. Variable credit; may be repeated for credit. Primarily for undergraduates. S-U or letter grades. Staff.

Courses on selected topics in neurobiology and behavior; can include lecture and seminar courses. See department office (W363 Mudd Hall) for offerings.

[BIONB 4205 Topics in Neurobiology and Behavior: Darwinian Medicine Seminar]

Summer, 6-week session. 3 credits. Pre- or corequisite: BIONB 2210. S-U or letter grades. Planned: M-F 3–4:15. Next offered summer 2011. J. Shellman Sherman.

We explore how and why a Darwinian approach to medicine can provide us with important insights and a more complete understanding of health and disease than that offered solely by a traditional approach to medicine.]

[BIONB 4210 Effects of Aging on Sensory and Perceptual Systems (also PSYCH 4310/6310)]

Fall. 3 or 4 credits. 4-credit option involves term paper or creation of relevant web site. Limited to 35 students. Prerequisites: introductory course in biology or psychology, plus second course in perception, neuroscience, cognitive science, or biopsychology. S-U or letter grades. Planned T R 10:10–11:25. B. P. Halpern.

For description, see PSYCH 4310.

[BIONB 4220 Modeling Behavioral Evolution]

Fall. 4 credits. Limited to 25 students. Prerequisites: BIONB 2210, one year of calculus, course in probability or statistics, and permission of instructor; advanced undergraduates and graduate students. S-U or letter grades. Planned T R 2:55–4:10; computer lab TBA. Offered alternate years. H. K. Reeve.

Intensive lecture and computer lab course on modeling strategies and techniques in the study of behavioral evolution. Population-genetic (including quantitative-genetic), static optimization, dynamic programming, and game-theoretic methods are emphasized. These approaches are illustrated by application to problems in optimal foraging, sexual selection, sex ratio evolution, animal communication, and the evolution of cooperation and conflict within animal social groups. Students learn to critically assess recent evolutionary theories of animal behavior, as well as to develop their own testable models for biological systems of interest or to extend pre-existing models in novel directions. The Mathematica software program is used as a modeling tool in the accompanying computer lab (no prior experience with computers required).

[BIONB 4230 Cognitive Neuroscience (also PSYCH 4250/6250)]

Fall. 4 credits. Limited to 20 students. Prerequisites: introductory biology; biopsychology or neurobiology (e.g., PSYCH 2230 or BIONB 2210); and introductory course in perception,

cognition, or language (PSYCH 1200, 2090, 2140, or 2150 essential). S-U or letter grades. Graduate students, see PSYCH 6250. Planned M W F 9:05. One lab in sheep brain dissection. Offered alternate years; next offered 2010–2011. B. L. Finlay. For description, see PSYCH 4250.]

[BIONB 4240 Neuroethology (also PSYCH 4240)]

Fall. 4 credits. Limited to 50 students. Prerequisites: BIONB 2220 or equivalent with permission of instructor. S-U or letter grades. Planned M W F 10:10; disc TBA. Offered alternate years. C. D. Hopkins.

Neuroethologists take a comparative and evolutionary approach to study the nervous system. They ask, how do brains of animals compare and how did they come about through the process of evolution? How are neural circuits adapted to species-typical behavior? What is the hope and interest in the study of a large diversity of animals, compared to a specialized look at just a few mammalian species? Can we hope to understand how animals with specialized behaviors have specialized nervous systems? What is the sensory world of a real animal and how does it vary from species to species? These and other questions derive this introductory survey of neuroethology, including exotic senses, amazing motor programs, surprising integration.

[BIONB 4250 Molecular Neurophysiology]

Fall. 3 credits. Limited to 20 students. Prerequisite: BIONB 2220 or permission of instructor. S-U or letter grades. Planned T R 2:55–4:10. Offered alternate years. D. P. McCobb.

Focuses on ion channels, the primary proteins generating cellular electrical signals in nerve cells and other excitable cells (e.g., muscle, heart, glands). Reviews the latest electrophysiological and molecular genetic experiments. Diversity of electrophysiology deriving from channel structure and expression patterns is considered in the contexts of behavior and behavioral plasticity (learning), neural development, and channel evolution. Format includes written and oral presentations, reviewing scientific literature in selected areas, and proposing new experiments.

[BIONB 4260 Animal Communication]

Spring. 4 credits. Limited to 50 students. Prerequisite: BIONB 2210. Letter grades only. Planned T R 2:55–4:10; disc TBA.

Offered alternate years. S. L. Vehrencamp. Communication is the “glue” that holds societies together. This course examines how and why animals communicate. Topics include the role of the environment in shaping animal signals, whether animals tell the truth to each other, why some bird songs are simple and others complex, and what kinds of signals might be exchanged between species.

[BIONB 4270 Darwinian Medicine]

Fall. 4 credits. Limited to 30 students. Prerequisites: BIONB 2210 and BIOEE 2610 or 2780, and permission of instructor. Letter grades only. Planned T R 2:30–4:25. Offered alternate years; next offered 2010–2011. P. W. Sherman.

Writing-intensive advanced course for upper-division students. Lectures, discussions, student presentations examine topics in health and disease from an evolutionary perspective.]

[BIONB 4280 Clinical Neurobiology]

Fall. 3 credits. Limited to 20 students. Prerequisites: two courses from BIONB 2220, BIOGD 2810, BIOBM 3300 or 3310; co-registration in one of the two is acceptable by permission of instructor. Open to advanced undergraduates. S-U or letter grades. Planned M W 2:30-4:25. Offered alternate years; next offered 2010-2011. R. Booker.

This course focuses on the etiology, epidemiology, cellular and molecular basis, and strategies for treating a number of neurodiseases (e.g., Alzheimer's disease, depression, and ADHD).

[BIONB 4290 Olfaction and Taste: Structure and Function (also PSYCH 4290)]

Spring. 3 or 4 credits; 4-credit option requires term paper. Priority given to junior and senior psychology and biology majors and graduate students. Graduate students, see PSYCH 6290. Prerequisite: one 3000-level course in biopsychology or equivalent. S-U or letter grades. Planned T R 10:10-11:25. Offered alternate years; next offered 2010-2011. B. P. Halpern.

For description, see PSYCH 4290.]

[BIONB 4300 Experimental Molecular Neurobiology]

Spring. 4 credits. Limited to 12 students. Prerequisites: BIOBM 3300 or 3310. Recommended: BIOGD 2810. Letter grades only. Lab T (for times see www.nbb.cornell.edu/bionb430.shtml). Offered alternate years; next offered 2010-2011. D. L. Deitcher.

Experiments include PCR, cloning of DNA fragments, RNA purification, restriction digests, bacterial transformation, DNA sequencing, protein interactions. Emphasis on molecular techniques to study neurobiological problems.]

[BIONB 4310 Genes and Behavior]

Spring. 3 credits. Limited to 50 students. Prerequisite: BIONB 2220. S-U or letter grades. Planned T R 2:55-4:10. Offered alternate years. J. R. Fetcho.

Our genes influence how we behave. This lecture course explores the current understanding of how genes influence the behavior of a variety of animals, including humans. Topics include the genetic basis of hearing, movement, learning, memory, intelligence, sexual behavior, aggression, sleep, and diseases of behavior. The focus is on the unprecedented insight that modern molecular and genetic tools are providing into the genetic basis of behavior.

[BIONB 4320 Genetics and Evolution of Behavior]

Spring. 3 credits. Limited to 20 students. Prerequisite: BIONB 2210. Letter grades only. Planned T R 2:55-4:10. Offered alternate years; next offered 2011-2012. K. Shaw.

The astounding diversity of animal behaviors provides an endless source of fascination. This multidisciplinary course examines our current understanding of the evolution of such behavior, focusing on how and why behaviors evolve.]

[BIONB 4330 Consciousness and Free Will (also COGST 4310, PSYCH 5310)]

Spring. 4 credits. Limited to 15 students. Prerequisite: PSYCH 2140. Planned M 2-4:25. S. Edelman.

For description, see COGST 4310.

[BIONB 4340 Advanced Behavioral Ecology]

Spring, 8 weeks. 3 credits. Limited to 25 students. Prerequisites: BIONB 2210, BIOEE 2610 or 2780, permission of instructor. S-U or letter grades. Planned M W 12:20-2:15; disc F 12:20-2:15. Offered alternate years; next offered 2010-2011. W. D. Koenig.

An intensive course for upper-division students interested in behavioral ecology and sociobiology. Lectures, discussions, and student presentations examine topics including adaptation, communication, mating systems, sexual selection, sex ratios, inbreeding and outbreeding, altruism, kin recognition, and conflict and cooperation in animal societies.]

[BIONB 4350 Mechanisms of Animal Behavior]

Spring. 4 credits. Limited to 30 students. Prerequisites: BIONB 2210. Letter grades only. Planned M W F 2:30-3:20; lab R 2:30-4:25. Offered alternate years. T. D. Seeley.

Examination of the mechanisms underlying the adaptive behaviors of animals as revealed by whole-organism studies. After reviewing the sensory abilities of animals, we will look at how they find their way, communicate, learn and think, find food, choose mates, build nests, and live in societies.

[BIONB 4440 Neural Computation (also PSYCH 4440)]

Spring. 3 credits. Limited to 10 students. Prerequisites: PSYCH 2230 or BIONB 2220 required or permission of instructor. Recommended: BIONB 3300 or equivalent experience. S-U or letter grades. Planned T R 2:30-3:20, lab T R 3:35-4:25. Offered alternate years; next offered 2010-2011. T. A. Cleland.

For description, see PSYCH 4440.]

[BIONB 4460 Plant Behavior—Induced Plant Responses to Biotic Stresses, Lectures (also BIOEE 4460)]

Spring. 3 credits. Prerequisite: BIOEE 2610 or permission of instructor. S-U or letter grades. Planned M W F 2:30-3:20. A. Kessler and R. Raguso.

For description, see BIOEE 4460.

[BIONB 4461 Plant Behavior—Induced Plant Responses to Biotic Stresses, Laboratory (also BIOEE 4461)]

Spring. 1 credit. Limited to 12 students. Pre- or corequisite: BIOEE 4460 or BIONB 4460. S-U or letter grades. Planned R 2:30-4:25. A. Kessler and R. Raguso.

For description, see BIOEE 4461.

[BIONB 4700 Biophysical Methods (also AEP/VETMM 4700)]

Fall. 3 credits. Prerequisites: solid knowledge of basic physics and mathematics through sophomore level. Recommended: knowledge of cellular biology. Letter grades only. Planned M W 2:45-4:15. M. Lindau.

For description, see AEP 4700.

[BIONB 4910 Principles of Neurophysiology (also BME 4910)]

Spring. 4 credits. Limited to 20 students. Prerequisite: BIONB 2220 or written permission of instructor. S-U or letter grades for students outside the Neurobiology and Behavior concentration and graduate students, by permission of instructor. Planned M W 10:10; lab planned M or T 12:20-4:25. B. R. Johnson.

Laboratory-oriented course designed to teach the theory and techniques of modern cellular neurophysiology including computer acquisition and analysis of laboratory results. Lecture time is used to introduce laboratory exercises and discuss results, to supplement laboratory topics, and to discuss primary research papers. Extracellular and intracellular recording and voltage clamp techniques explore motor neuron and sensory receptor firing properties, and examine the cellular basis for resting and action potentials and synaptic transmission. Invertebrate preparations are used as model systems. See <http://courses.cit.cornell.edu/bionb491/index.html>.

[BIONB 4920 Sensory Function (also PSYCH 4920/6920)]

Spring. 4 credits. Limited to 25 students. Prerequisite: 3000-level course in biopsychology, or BIONB 2220, or BIOAP 3110, or equivalent; knowledge of elementary physics, chemistry, and behavior. S-U or letter grades. Graduate students, see PSYCH 6920. Planned M W F 10:10. Offered alternate years; next offered 2011-2012. B. P. Halpern.

For description, see PSYCH 4920.]

[BIONB 4930 Developmental Neurobiology]

Fall. 3 credits. Limited to 20 students. Prerequisite: BIONB 2220 or permission of instructor. S-U or letter grades by permission of instructor. Planned M W 2:55-4:10. Offered alternate years. R. Booker.

Lectures covering the development of the nervous system, taking examples from both vertebrates and invertebrates. Emphasis is on cellular and molecular issues, that is, how do nerve cells differentiate both morphologically and biochemically? The role of cues such as hormones and developmental genes in neural development is discussed. Readings are taken from original journal articles.

[BIONB 4940 Brain Evolution and Behavior]

Fall. 3 credits. Limited to 50 students. Intended for juniors, seniors, and graduate students. Prerequisite: BIONB 2220 or equivalent. S-U or letter grades. Offered alternate years; next offered 2010-2011. A. H. Bass.

Organization and evolution of neuroanatomical pathways as substrates for species-typical vertebrate behaviors.]

[BIONB 4950 Molecular and Genetic Approaches to Neuroscience]

Fall. 3 credits. Limited to 25 students. Prerequisites: junior, senior, or graduate standing; BIONB 2220 and BIOBM 3300 or 3320. Letter grades only. Planned T R 2:55-4:10. Offered alternate years; next offered 2010-2011. D. L. Deitcher.

Focuses on how molecular and genetic approaches have led to major advances in neuroscience. Lectures, student presentations, and discussions examine research articles.]

[BIONB 4960 Bioacoustic Signals in Animals and Man]

Fall. 3 credits. Limited to 12 students. Prerequisites: junior, senior, or graduate standing; one year introductory biology, PHYS 1101-1102 or 2207-2208, and permission of instructor. S-U or letter grades. Planned M W 9:05; lab R 3-5. Offered alternate years; next offered 2010-2011. C. W. Clark and R. R. Hoyt.

Teaches students about animal acoustic signaling by introducing them to various animal acoustic systems.]

BIONB 4980 Teaching Experience

Fall and spring. 1–4 credits. Limited enrollment. Prerequisites: previous enrollment in course to be taught or equivalent. Note: Arts students may not count this course toward graduation but may, upon petition (one time only) to their class dean, carry fewer than 12 other credits and remain in good standing. This would affect Dean's List eligibility but not eligibility for graduating with distinction. S–U or letter grades by permission of the instructor. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring.

BIONB 7200 Advanced Topics in Neurobiology and Behavior

Fall and spring. Variable credit; may be repeated for credit. Prerequisite: graduate standing or permission of instructor. S–U or letter grades. Staff.

Designed to provide several study groups each semester on specialized topics. A group may meet for whatever period is judged adequate to enable coverage of the selected topics. Ordinarily, topics are selected and circulated during the preceding semester. Discussion of current literature is encouraged. See department office (W363 Mudd Hall) for offerings.

BIONB 7201 Research Design in the Study of Animal Social Behavior

Fall and spring. 1 credit; may be repeated for credit. Graduate students only. S–U grades only. Staff.

A weekly journal club–style discussion. Graduate students may be expected to present a summary of their research or a summary of research in the literature related to their thesis once per year.

BIONB 7202 Current Topics in Neuroethology

Fall and spring. 1 credit; may be repeated for credit. Graduate students only. S–U grades only. Staff.

A weekly journal club–style discussion. Graduate students may be expected to present a summary of their research or a summary of research in the literature related to their thesis once per year.

BIONB 7203 Research Design in Cellular and Molecular Neurobiology

Fall and spring. 1 credit; may be repeated for credit. Graduate students only. S–U grades only. Staff.

A weekly journal club–style discussion. Graduate students may be expected to present a summary of their research or a summary of research in the literature related to their thesis once per year.

BIONB 7210 Introductory Graduate Survey in Neurobiology and Behavior

Fall and spring. 2 credits. Requirement for graduate students majoring in neurobiology and behavior. Concurrent registration in BIONB 2210 and 2220 required. S–U grades only. Planned W 4:30–6:00. J. R. Fetcho and staff.

A year-long, graduate-level seminar with presentations from lecturers in BIONB 2210 and 2220. Discussions of current research in the area of neurobiology or behavior that have been presented in the lecture class. A lab project and/or a writing component each week could be assigned to ensure engagement with the material.

Related Courses in Other Departments

Evolutionary Perspectives on Behavior (PSYCH 6350)

Biopsychology of Normal and Abnormal Behavior (PSYCH/NS 3610)

Developmental Biopsychology (PSYCH 4220)

Evolution of Human Behavior (PSYCH 3260)

Topics in Biological Anthropology (ANTHR 4390)

Primate Behavior and Ecology (ANTHR 3390)

Teaching Experience (BIOG 4980)

The Brain and Sleep (PSYCH 4400/6400)

Independent Undergraduate Research in Biology (BIOG 4990)

OTS Undergraduate Semester Abroad Programs

Shoals Marine Laboratory Program

Spider Biology: Life on a Silken Thread (ENTOM 2150)

Navigation, Memory, and Context: What Does the Hippocampus Do? (PSYCH 4230/6230)

PLANT BIOLOGY (BIOPL)

BIOPL 1120 Issues in Social Biology: from Diet to Diseases, DNA to Deforestation

Spring or summer, 3-week session. 3 credits. S–U or letter grades. P. J. Davies.

An analysis of current issues of biological relevance and the biological science behind these issues. Topics will include issues such as food and nutrition, antioxidants, organic produce, disease prevention, athletic enhancers, genetic testing, cancer, stem cells and animal cloning, genetically modified crops, bacteria and antibiotics, viruses, risk, statistics and epidemiology, photosynthesis and global warming, extinction and overpopulation, invasive species, resource over-utilization. The topics will vary according to current issues.

BIOPL 1250 Biology Seminar

Fall and spring. 1 credit. Prerequisite: first-year standing or permission of instructor. S–U grades only. Staff.

A first-year seminar designed for students with Biology AP credit or a strong interest in research. Students will interact with faculty while learning to read and evaluate scientific publications on current biological topics. Multiple topics and sections will be offered each semester.

BIOPL 2210 Natural Remedies in Ethnohealth

Fall. 2 credits. Prerequisites: course work in biology and sociology and health or related area, or permission of instructor. E. Rodriguez.

This course is an introduction to two aspects of ethnomedicine/ethnohealth: (1) the study of biology of health disparities like diabetes, cancer, and infectious diseases in Latinos/as, African Americans and American Indians in the United States, (2) and the botany, culture, and medical anthropology of plants and other natural remedies used by ancient cultures in the Americas and also currently used throughout the United States and the Americas.

BIOPL 2400 Green World/Blue Planet

Fall or summer, 6-week session. 3 credits. S–U or letter grades. Lec. and disc. T. Silva.

Focuses on helping individuals understand how scientific information relates to the issues they face as citizens, in management decision making, and in public policy. To what extent should genetic engineering of crop plants be permitted? Should we place limits on fossil fuel consumption as a means of limiting global warming and global climate change? Must human endeavors be restricted in certain areas to maintain diversity? The format of this course is interactive, with lectures and discussions about how we as a society deal with controversial issues.

BIOPL 2410 Introductory Botany

Fall. 3 credits. Lec. lab. K. J. Niklas.

Introductory botany for those interested in the plant sciences. Emphasizes structure, reproduction, and classification of angiosperms and the history of life on earth. Laboratory emphasizes development of skills in handling plant materials, including identification. First and second weeks of laboratory are field trips, starting with the first day of classes. *Those who register for an evening laboratory are still required to attend the afternoon field trips.*

BIOPL 2420 Plant Function and Growth Lectures

Spring. 3 credits. Primarily for undergraduates in agricultural sciences but also for any biological sciences students wanting to know about plant function; suitable as second-level course for nonmajors to satisfy biology distribution requirement. Prerequisites: one year introductory biology and/or BIOPL 2410. Corequisite for plant science undergraduates (and highly recommended for other science majors): BIOPL 2421. Recommended: one year introductory chemistry. May not be taken for credit after BIOPL 3420 except by written permission of instructor. S–U or letter grades. Evening prelims. P. J. Davies.

How plants function and grow. Examples deal with crop plants or higher plants where possible, though not exclusively. Topics include cell structure and function; plant metabolism, including photosynthesis; light relations in crops; plant-water relations; water uptake, transport, and transpiration; irrigation of crops; sugar transport; mineral nutrition; growth and development—hormones, responses to light, flowering, fruiting, dormancy, and abscission; stress; tissue culture; and genetic engineering of plants.

BIOPL 2421 Plant Function and Growth, Laboratory

Spring. 2 credits. Limited to 14 students per sec. Corequisite: BIOPL 2420. May not be taken for credit after BIOPL 3440. Disc and lab; students must take lab and disc on same day. T. Silva.

Experiments exemplify concepts covered in BIOPL 2420 and offer experience in a variety of biological and biochemical techniques, from the cellular to whole plant level.

[BIOPL 2430 Taxonomy of Cultivated Plants (also HORT 2430)]

Fall. 4 credits. Prerequisite: one year introductory biology or written permission of instructor. May not be taken for credit after BIOPL 2480. Lec, lab. Offered alternate years; next offered 2010-2011. M. A. Luckow.

Study of ferns and seed plants, their relationships, and their classification into families and genera, emphasizing cultivated plants. Particular emphasis is placed on gaining proficiency in identifying and distinguishing families and in preparing and using analytic keys. Attention is also given to the economic importance of taxa, to the basic taxonomic literature, and to the elements of nomenclature.]

BIOPL 2450 Plant Biology

Summer, six-week session. 3 credits.

Limited to 24 students. Lec, lab. T. Silva.

Introductory botany, including plant identification. Emphasizes structure, reproduction, and classification of flowering plants. Much of the laboratory work is conducted outdoors taking advantage of several outstanding natural areas available for study. Those who lack college-level biology are expected to work closely with the instructor on supplemental instructional materials.

[BIOPL 2470 Ethnobiology]**BIOPL 2480 Vascular Plant Systematics**

Spring. 4 credits. Prerequisite: introductory course in biology or botany or permission of instructor. May not be taken for credit after BIOPL 2430. S-U or letter grades. Lec, lab. Offered alternate years. J. I. Davis.

Introduction to the classification of vascular plants, with attention to the goals of taxonomy, the processes of plant evolution, and the means of analyzing evolutionary relationships among plants. The laboratory presents an overview of vascular plant diversity, with particular attention to the flowering plants.

BIOPL 2490 Hollywood Biology: Science in Cinema

Spring. 3 credits. Lec. Letter grades. M. Scanlon.

Biological subjects presented in Hollywood films. Lecture topics include the scientific method, Darwinism, development, paleobiology, animal cloning, genome sequencing, forensic DNA, artificial intelligence, eugenics, and epidemiology as background to discussions of their presentation in selected films. Themes: Genetics/Genomics; Evolution; Development; Epidemiology; Physical Anthropology; and Genetic Engineering. Does not fulfill any requirement of the biology major.

BIOPL 3420 Plant Physiology, Lectures

Spring. 3 credits. Prerequisites: one year introductory biology. Corequisite: BIOPL 3440 or written permission of instructor. May not be taken for credit after BIOPL 2420 unless written permission obtained from instructor. Lec. T. G. Owens.

Integrated and interdisciplinary study of the processes that contribute to the growth, competition, and reproduction of plants.

Topics include, but are not limited to, plant-water relations, membrane properties and processes, photosynthesis, plant respiration, mineral and organic nutrition, stress physiology, control of growth and development, and responses to the environment. Emphasis is on the relationship between structure and function from the molecular to the whole-plant level.

BIOPL 3421 Plant Physiology, Laboratory

Spring. 2 credits. Corequisite: BIOPL 3420. May not be taken for credit after BIOPL 2440. Similar to BIOPL 2440 but at more advanced level. Lab, disc. T. Silva.

Experiments exemplify concepts covered in BIOPL 3420 and offer experience in a variety of biological and biochemical techniques, from the cellular to whole plant level, with emphasis on experimental design.

BIOPL 3430 Molecular Biology and Genetic Engineering of Plants

Spring. 2 credits. Prerequisite: one year general biology or permission of instructor. S-U or letter grades. Lec. M. E. Nasrallah.

Introduction to current studies involving recombinant DNA technology and its application to the improvement of plants. Emphasizes genetic transformation methodology, gene expression systems, and strategies for increasing productivity. The course is directed toward undergraduates who wish to become familiar with the theory and practice of plant biotechnology.

BIOPL 3431 Laboratory in Molecular Biology and Genetic Engineering of Plants

Spring. 2 credits. Limited to 24 students. Prerequisite: BIOPL 3430 or permission of instructor. Recommended: concurrent enrollment in BIOPL 3430. S-U or letter grades. Lab. M. E. Nasrallah.

Companion to BIOPL 3430 with laboratory activities that focus on the practice of plant biotechnology. Students transfer genes to plants by a variety of methods and analyze their expression in the host genome by use of reporter gene assays and by the preparation and analysis of nucleic acids.

BIOPL 3450 Plant Anatomy

Fall. 4 credits. Limited to 15 students. Prerequisite: introductory course in biology or botany or permission of instructor. May not be taken for credit after BIOPL 3470. Lec, lab. A. Gandolfo.

Descriptive course with equal emphasis on development and mature structure. Lecture, laboratory, and reading are integrated in a study guide. The laboratory offers the opportunity to develop the practical skills required to make anatomical diagnoses and to write anatomical descriptions.

[BIOPL 3480 The Healing Forest

Spring. 2 credits. Prerequisites: introductory biology or plant biology or permission of instructor. Lec/disc. Offered alternate years. Staff.]

[BIOPL 3590 Biology of Grasses

Spring. 2 credits. Prerequisite: one year introductory biology or course in plant systematics or permission of instructor. S-U or letter grades. Lec. Lab. Offered alternate years; next offered 2010-2011. J. I. Davis.

Systematics and related aspects of the biology of the graminoid plant families (grasses, sedges, and rushes), with the principal emphasis on grasses. Major topics include phylogenetics, taxonomy, physiology, reproductive biology, speciation, and biogeography. The roles of graminoid plants in natural and human-disturbed environments are discussed, as are the origins of cultivated species.]

BIOPL 3800 Strategies and Methods in Drug Discovery

Spring. 2 credits. Prerequisite: one year introductory biology and organic chemistry course or permission of instructor. S-U or letter grades. M. A. Aregullin.

Covers strategies and methodologies in chemotaxonomy, chemical ecology, and ethnobotany, as they are used in chemical prospecting for new pharmaceuticals. Discusses the biosynthesis and distribution of plant secondary metabolites, the use of techniques in isolation and structure elucidation of natural products, and biological assays in the discovery of chemicals with pharmacological activity.

[BIOPL 4010 Introduction to Scanning Electron Microscopy]**[BIOPL 4030 Transmission Electron Microscopy for Biologists]****BIOPL 4040 Crop Evolution, Domestication and Diversity (also PLBR/IARD 4040)**

Fall. 2 credits. Prerequisites: BIOGD 2810 or PLBR 2250 or permission of instructor. S-U or letter grades. Lec. S. Kresovich.

For description, see PLBR 4040.

[BIOPL 4220 Plant Development

Fall. 2 credits. Lec. Prerequisites: course work in molecular biology (e.g., BIOBM 3300, 3310/3320, or 3330), and genetics (e.g., BIOGD 2810), or permission of instructor. S-U or letter grades. J. Hua. Introduction to plant development, studying the mechanisms of morphogenesis and cell fate determination at the organismal, cellular, and molecular levels.]

[BIOPL 4400 Phylogenetic Systematics (also ENTOM 4400)]

Spring. 4 credits. Limited to 24 students. Prerequisite: introductory biology or permission of instructor. Lec, lab. Offered alternate years; next offered 2010-2011. K. C. Nixon.

Basic and advanced theory and methods of phylogenetic analysis. Introduces students to cladistic analysis using parsimony and gain experience with computer-aided analysis of taxonomic data, including both morphological and molecular data sources. Topics include applications of phylogenetic methods to biogeography and evolutionary studies.]

[BIOPL 4420 Current Topics in Ethnobiology

Fall. 2 credits. Limited to 12 students. Prerequisite: permission of instructor. S-U or letter grades. Lec/disc. Offered alternate years. Staff.]

BIOPL 4430 Topics and Research Methods in Systematics

Fall or spring. 1–2 credits; 1 credit per sec.
Prerequisite: written permission of instructor. S–U or letter grades.
K. C. Nixon.

Series of 1-credit modules on specialized topics in systematics. Topics and instructors vary each semester. May not be taught every semester. Topics and instructors are listed in the division's catalog supplement issued at the beginning of the semester.

BIOPL 4440 Plant Cell Biology

Fall. 4 credits. Limited to 24 students.
Prerequisites: one year introductory biology or permission of instructor. Lec, lab. R. O. Wayne.

Uses evidence from microscopy, physiology, biochemistry, and molecular biology to try to unravel the mystery of the living cell. Studies the dynamics of protoplasm, membranes, and the various organelles. The mechanisms of cell growth and division, the relationship of the cytoskeleton to cell shape and motility, the interaction of the cell with its environment, and the processes that give rise to multicellular differentiated plants are investigated.

BIOPL 4450 History of Systematic Botany

Fall. 3 credits. S–U or letter grades. Lec.
Offered alternate years. J. Reveal.

An historical overview from early man to the present day of systematic botany concentrating on nomenclature and classification with an emphasis of botanical explorations and their impact on plant taxonomy.

BIOPL 4470 Molecular Systematics

Fall. 3 credits. Prerequisites: BIOEE 2780 or BIOGD 2810 or BIOBM 3300, or BIOBM 3320, or written permission of instructor.
Lec. Offered alternate years. J. J. Doyle.

Theory and practice of using molecular evidence, particularly DNA sequence data, for addressing diverse systematic and evolutionary questions. Emphasis is on phylogeny reconstruction, particularly in eukaryotic systems. The organization and evolution of nuclear and organellar genomes is described from the standpoint of their suitability for systematic and evolutionary studies.

BIOPL 4480 Plant Evolution and the Fossil Record

Spring. 3 credits. Prerequisite: BIOPL 2410 or equivalent, or permission of instructor.
Lec, lab. Offered alternate years.
K. J. Niklas and W. L. Crepet.

Introduction to evolution, surveying major changes in plants from the origin of life to the present. Emphasizes plant form and function, adaptations to particular ecologic settings, and evolutionary theory as it relates to plants.

BIOPL 4490 Green Signals and Triggers—The Plant Hormones (also HORT 4490)

Spring. 2 credits. Prerequisite: one year introductory biology and plant physiology (BIOPL 2420 or 3420) or permission of instructor. S–U or letter grades. Offered alternate years. P. J. Davies.

Study of plant hormones and how they regulate plant growth and development. Topics include the discovery, role in growth and development, mode of action, and practical uses of the plant hormones auxin, gibberellins, cytokinins, abscisic acid, ethylene, and brassinosteroids.

BIOPL 4500 Light and Video Microscopy for Biologists

Fall. 3 credits. Limited to 12 students.
Prerequisites: one year introductory biology and permission of instructor. Lec, lab. R. O. Wayne.

Students learn the relationship between reality and the image using philosophy, mathematics, and physical theory. Next they apply these tools theoretically and in practice to understand and become experts at image formation and analysis using brightfield, darkfield, phase-contrast, fluorescence, polarization, interference, differential interference, and modulation contrast microscopes. They build upon our knowledge and experience to understand how analog image processors and digital image processors can influence, enhance, and analyze the images gathered by the microscope. Last they learn about many other kinds of microscopes, including confocal, near field, x-ray, acoustic, nuclear magnetic resonance, infrared, centrifuge, atomic force, and scanning tunneling microscopes.

[BIOPL 4520 Systematics of Tropical Plants

Fall. 3 credits. Prerequisite: BIOPL 2430 or 2480. Letter grades only. Lec, lab. Offered every three years. K. C. Nixon.

The families of plants encountered solely or chiefly in tropical regions are considered in a phylogenetic context in lectures, discussions, and laboratory, with the aim of providing basic points of recognition for, and an understanding of, diversity and relationships in these families.]

[BIOPL 4521 Systematics of Tropical Plants: Field Laboratory

Spring. 1 credit. Limited to 15 students.
Prerequisite: BIOPL 4520 or permission of instructor. Letter grades only. For more details and application, contact L. H. Bailey Hortorium, 467 Mann Library. Offered every three years. K. C. Nixon.

Intensive orientation to families of tropical flowering plants represented in forests of the American Tropics. Emphasis is on field identification combined with laboratory analysis of available materials in a "whole-biology" context. Two-week field trip over winter break.]

[BIOPL 4530 Principles and Practice of Historical Biogeography (also ENTOM 4530)

Fall. 3 credits. Prerequisite: systematics course or permission of instructors. S–U or letter grades. Lec, lab. Offered alternate years. J. K. Liebherr and M. A. Luckow.

For description, see ENTOM 4530.]

BIOPL 4620 Plant Biochemistry

Spring. 3 credits. Prerequisites: BIOPL 2420 or 3420 or equivalent and BIOBM 3300 or 3310 or equivalent or permission of instructor. Letter grades only. Lec. J. Rose and K. Van Wijk.

Focuses on biochemistry of plant specific processes, with the aim to obtain an integrative overview of plant biochemistry. Examples include processes such as cell wall biochemistry, pigment biosynthesis and degradation, secondary metabolism, senescence, defense mechanisms, amino acid biosynthesis, and small molecule transport. Genomics-based experimental tools such as proteomics and metabolomics are discussed.

BIOPL 4821–4822 Molecular Plant-Pathogen Interactions I and II (also PLPA 4821)

Spring. 1 credit. 12 lec. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOB 3310. S–U or letter grades. A. Collmer and B. G. Turgeon, odd years; S. G. Lazarowitz and G. Martin, even years.

For description, see PLPA 4821 and 4822.

BIOPL 4823 Molecular Plant-Microbe Interactions (also BIOMI 4640, PLPA 4822)

Spring. 1 credit. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. S–U or letter grades. 12 lec. Offered alternate years. S. C. Winans.

Focuses on the interactions of *Agrobacteria* and *Rhizobia* with plants. Topics on *Agrobacterium*-plant interactions include plant-microbe recognition mechanisms, T-DNA transfer process, oncogenesis, and use of *Agrobacterium* to produce transgenic plants. Topics on *Rhizobium*-plant interactions include regulation of nitrogenase activity and expression, organization and function of the *sym* plasmid, nodule development, and plant genetics involved in plant-microbe interaction.

[BIOPL 4824 Plant Gene Evolution and Phylogeny

Spring. 1 credit. 12 lec. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. Offered alternate years; next offered 2010–2011. J. J. Doyle.

Practical applications of molecular systematics/evolution for plant molecular biologists and other non-systematists. The course focuses on two basic issues: methods and principles for inferring relationships among genes and the use of data to hypothesize relationships among plants. Evolutionary patterns and processes of genes and gene families are discussed, as well as rates of sequence evolution, paralogy and orthology, the effects of recombination and concerted evolution of gene phylogenies, and the implications of using gene or allele phylogenies to infer organismal evolutionary patterns.]

[BIOPL 4825 Molecular Biology of Plant Organelles (also BIOGD 4825)

Spring. 1 credit. 12 lec. Prerequisites: BIOPL 4831 or BIOGD 2810 and permission of instructor. Recommended: BIOBM 3310 or equivalent. Letter grades or S–U grades with permission of instructor. Offered alternate years; next offered 2010–2011. M. R. Hanson and D. B. Stern.

Plants contain three different genomes—in the nucleus, chloroplasts, and mitochondria. This course examines the organization, expression, and evolution of plant organelle genomes. Special topics include RNA editing and stability, effects of organelle mutations on plant reproduction and photosynthesis, and chloroplast transformation for expression of useful foreign proteins.]

BIOPL 4826 Plant Biotechnology (also PLBR 4826)

Spring. 1 credit. 12 lec. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. S–U or letter grades. E. D. Earle.

Deals with production and uses of transgenic plants for agricultural and industrial purposes. Topics include procedures for gene

introduction and control of gene expression, as well as strategies for obtaining transgenic plants that are resistant to insects, diseases, and herbicides, produce useful products, or have improved nutritional and food processing characteristics. Regulatory and social issues relating to plant biotechnology are discussed.

BIOPL 4827 Plant Cell Walls: Structure to Proteome

Spring. 1 credit. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. S-U or letter grades. 12 lec. Offered alternate years. J. Rose.

Examines the structure and function of plant cell walls, exploring their dynamic nature and fundamental contribution to numerous aspects of plant growth and development. Topics include wall biosynthesis; wall structure and composition; regulation of cell expansion and differentiation; defense against pathogens and signaling; the apoplast as a metabolically active subcellular compartment; and analytical techniques: from biochemistry to proteomics.

BIOPL 4829 Light Signal Transduction in Plants

Spring. 1 credit. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. S-U or letter grades. 12 lec. Offered alternate years. T. Brutnell.

In addition to providing plants with energy for photosynthesis, light plays an essential role in the development of higher plants. Light quality and intensity is carefully monitored by the plant to avoid neighboring vegetation, set the circadian clock, and adjust photosynthesis rates. This course focuses on recent studies that have illuminated the molecular basis of light signal transduction networks in higher plants. Readings are assigned from current literature with an emphasis on those that use genomics tools such as microarray analysis to address fundamental questions in red/far-red and blue light signal transduction.

BIOPL 4831 Concepts and Techniques in Plant Molecular Biology (also PLPA/BIOGD/PLBR 4831)

Fall. 2 credits. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. Lec. S-U or letter grades. M. Scanlon, M. Hanson, and T. Owens.

Introductory module that provides a broad overview of molecular biology concepts relevant to the plant sciences. Serves as a prerequisite to other modules in the BIOPL 4830 (fall) and BIOPL 4820 (spring) classes. Course covers genetic concepts relevant to molecular markers, map-based cloning, insertional mutagenesis, forward and reverse mutant screens, analysis of transcriptomes, organelle and nuclear genome structure, and transformation. Techniques include nucleic acid manipulation, blot and in situ hybridization, chromatin immunoprecipitation, high throughput sequencing, PCR, microscopy, laser microdissection, microarrays, metabolomic profiling, proteomics, protein-protein interactions, electrophoresis, and immunological methods.

BIOPL 4832 Proteomics and Protein Mass Spectrometry in Biology (also PLPA/PLBR 4832)

Fall. 1 credit. 12 lec. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. S-U or letter grades. Offered alternate years. K. van Wijk.

Introduction to proteomics and mass spectrometry and its application in plant biology. Includes discussion of protein separation, protein tagging and visualization techniques; principles of biological mass spectrometry and interpretation of spectra; bioinformatics tools in proteomics; comparative proteomics; phosphorylation mapping. Discusses limitations and possibilities of proteomics on plants for which little sequence information is available and experimental papers involving plant proteomics.

[BIOPL 4833 Plant Genome Organization and Function (also PLBR 4833)]

Fall. 1 credit. 12 lec. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. S-U or letter grades. Offered alternate years; next offered 2010-2011. S. D. Tanksley.

Covers the structure and variation of plant nuclear genomes, including changes in genome size, centromere/telomere structure, DNA packaging, transposable elements, genetic and physical mapping, positional gene cloning, genomic sequencing and comparative genomics.]

[BIOPL 4834 Molecular Aspects of Plant Development I (also BIOBM 4834)]

Fall. 1 credit. 12 lec. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. Offered alternate years; next offered 2010-2011. J. B. Nasrallah.

Focuses on the molecular genetics of plant development with an emphasis on plant reproductive biology. Current approaches to the elucidation of the molecular signals and pathways that lead to the establishment of the differentiated state of floral cells and organs are discussed. Topics include cell-cell signalling in the establishment of pattern and functional differentiation of specialized cell types, and the control of developmental pathways by endogenous and external cues. It is a companion to BIOPL 4823 (Molecular Plant-Microbe Interactions).]

BIOPL 4835 Molecular Breeding (also PLBR 4835)

Fall. 1 credit. 12 lec. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. S-U or letter grades. Offered alternate years. S. D. Tanksley.

Application of DNA markers to the identification, manipulation, and isolation of genes important to plant and animal productivity using molecular genetic techniques. Students learn how to design and execute experiments to identify quantitative trait loci (QTLs), as well as how to apply molecular markers to plant and animal breeding programs.

[BIOPL 4836 Plant Senescence (also HORT 6252)]

Fall. 1 credit. 12 lec. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. S-U or letter grades. (12 lec). Offered alternate years; next offered 2010-2011. S. Gan.

Introduces molecular, genetics, and genomics approaches in plant senescence and postharvest research. Topics include gene expression, regulation, and function associated with physiological and biochemical changes in senescing, maturing, and/or ripening plants or parts. Genetic manipulation of senescence/ripening processes are also discussed.]

BIOPL 4980 Teaching Experience

Fall or spring. 1-4 credits. Limited enrollment. Prerequisites: previous enrollment in course to be taught or equivalent. Note: Arts students may not count this course toward graduation but may, upon petition (one time only) to their class dean, carry fewer than 12 other credits and remain in good standing. This would affect Dean's List eligibility but not eligibility for graduating with distinction. S-U or letter grades by permission of the instructor. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring.

BIOPL 6410 Laboratory in Plant Molecular Biology (also BIOBM 6410)

Fall. 4 credits. Prerequisites: BIOGD 2810 or equivalent, BIOBM 3300 or 3310 or equivalent, and permission of instructor. S-U grades by permission of instructor. Lab. M. R. Hanson, H. Wang, T. Brutnell, G. Jander, J. Hua, M. Scanlon, and K. van Wijk.

Includes selected experiments on gene expression, biolistic transformation, confocal microscopy, laser capture microdissection, microarray analysis, genetic mapping and mutant analysis, transposon tagging, proteomics, and metabolite analysis.

[BIOPL 6420 Plant Mineral Nutrition (also CSS 6420)]

Spring. 3 credits. Prerequisite: BIOPL 3420 or equivalent. Lec. Offered alternate years; next offered 2010-2011. O. K. Vatamaniuk, L. V. Kochian, and R. M. Welch.

For description, see CSS 6420.]

BIOPL 6470 Systematic Biology Journal Club

Fall or spring. 1 credit; may be repeated for credit. Intended for graduate students and advanced undergraduates in systematic biology. S-U grades only. Disc TBA. Bailey Hortorium staff.

Discussions led by staff, visitors, and students on topics of current importance to systematic biology.

[BIOPL 6490 Solute Transport in Plants (also BEE 6490)]

Fall. 3 credits. Letter grades only. Lec. Offered alternate years; next offered 2010-2011. R. M. Spanswick.

For description, see BEE 6490.]

BIOPL 6510 Water Transport in Plants (also BEE 6470)

Fall. 2 credits. Letter grades only. Lec. Offered alternate years. R. M. Spanswick.

For description, see BEE 6470.]

[BIOPL 6540 Botanical Nomenclature

Fall. 3 credits. Prerequisite: written permission of instructor. S-U or letter grades. Lec and disc. Offered alternate years; next offered 2010-2011. J. Reveal. Analysis of the International Code of Botanical Nomenclature and its application to various plant groups.]

[BIOPL 6560 Topics in Plant Evolution

Spring. 1 credit. Prerequisite: BIOPL 4480 or equivalent background in evolution, or written permission of instructor. Lab and disc. Offered alternate years; next offered 2010-2011. K. J. Niklas.

Series of selected topics to provide a background in plant evolution, paleobotanical literature, and evolutionary theory. Among the topics discussed are the origin of a terrestrial flora, the evolution of the seed plants, and the origin and adaptive radiation of the angiosperms.]

BIOPL 7400 Plant Biology Seminar

Fall and spring. 0 credits. Requirement for graduate students doing work in plant biology. W. L. Crepet.

Lectures on current research in plant biology, presented by visitors and staff.

BIOPL 7410 Problems in Plant Cell and Molecular Biology

Spring. 2 credits. Prerequisite: first- and second-year graduate students in Plant Cell and Molecular Biology Program. Disc.

Introduction to the research literature in plant molecular and cellular biology through weekly problem sets and discussions.

BIOPL 7420 Current Papers in Plant Biology

Fall or spring. 1 credit. Limited enrollment. Primarily for graduate students, with priority given to majors or minors in plant molecular biology. Prerequisite: for undergraduates, written permission of instructor. S–U grades only. Sem. Staff.

BIOPL 7430 Faculty Research in Plant Cell and Molecular Biology

Fall. 1 credit. Prerequisite: graduate standing or written permission from member of Plant Cell and Molecular Biology Program or from coordinator for undergraduates. Disc TBA. Staff.

Introduction for graduate students to the research being conducted by Cornell faculty in the Plant Cell and Molecular Biology Program.

BIOPL 7440 Graduate Research in Plant Cell and Molecular Biology

Fall or spring. 1 credit. Requirement for, and limited to, all graduate students in the Field of Plant Biology. Sem. Staff.

After the first year, each student presents one seminar per year on his or her thesis research and then meets with the thesis committee members for evaluation. First-year students only attend the seminar series, they do not present. Second-year students give a 25-min. seminar, while students in their third and higher years present a 50-min. seminar.

BIOPL 7450 Seminar in Systematic Botany

Fall. 1 credit. Prerequisite: graduate standing or permission of instructor. S–U grades only. Sem. Bailey Hortorium staff.

Seminar with student presentations of current topics in systematics.

BIOPL 7460 Seminar in Systematic Botany: Student Research

Spring. 1 credit. Prerequisite: graduate standing or permission of instructor. Letter grades only. Sem. Bailey Hortorium staff.

Student-led seminar presentation based on his or her thesis research or a related topic.

BIOPL 7490 Graduate Research in Botany

Fall or spring. Variable credit, may be repeated for credit. S–U or letter grades. Staff.

Similar to BIOG 4990 but intended for graduate students who are working with faculty members on an individual basis.

Related Courses in Other Departments

Current Topics in Plant Molecular Ecology (BIOEE 6750)

Fungal Biology (PLPA 6490)

Fungi (PLPA 3090)

Marine Botany (BIOSM 4490)

Physiological Plant Ecology, Lectures and Laboratory (BIOEE 4660/4661)

Plant Behavior–Induced Plant Responses to Biotic Stresses (BIOEE 4460)

Plant Cytogenetics Laboratory (PLBR 4460)

Undergraduate Research in Biology (BIOG 4990)

COURSES IN MARINE SCIENCE

Cornell offers an extensive listing of undergraduate courses in marine science. Undergraduates interested in pursuing studies in marine science are encouraged to explore the undergraduate specialization in marine biology, the undergraduate specialization in ocean sciences, and the summer program of courses offered by the Shoals Marine Laboratory. For further information on all of these programs, contact the Shoals Marine Laboratory Office, G14 Stimson Hall, or at www.sml.cornell.edu.

Undergraduate Specialization in Marine Biology

Biological Sciences majors who are concentrating in Ecology and Evolutionary Biology have the option of specializing their studies in the area of Marine Biology. This specialization is intended for students with interests in understanding the unique aspects of organismal biology in the marine environment. Students specializing in Marine Biology are expected to spend significant time at the Shoals Marine Laboratory, Cornell's marine field station on Appledore Island, Maine, where they may take introductory and advanced courses for Cornell credit, do an independent research project, and complete a paid internship. See www.sml.cornell.edu for details.

Undergraduate Specialization in Ocean Sciences

Science of Earth Systems majors have the option of specializing their program of study in the area of ocean sciences. This interdisciplinary specialization is intended for students with interests in understanding the interaction of biological, chemical, geological, and physical processes in ocean systems. In addition to fulfilling the Science of Earth Systems general requirements (see the SES program description in Interdisciplinary Centers, Programs, and Studies section of catalog), students in ocean sciences are required to take four courses from the following list to fulfill their major.

BIOSM 3060 Evolution of Ancient and Modern Oceans

BIOSM 3080 Field Microbial Ecology

BIOSM 3090 Coastal Ecology and Bioclimates

BIOSM 3100 Marine Symbiosis

BIOSM 3120 Biology of the Lobster

BIOSM 3200 Functional Morphology of Marine Organisms

BIOSM 3210 Anatomy and Function of Marine Vertebrates

BIOSM 3220 Ecology of Biological Invasions

BIOSM 3290 Ecology of Animal Behavior

BIOSM 3640 Field Marine Science

BIOSM 3650 Underwater Research

BIOSM 3740 Field Ornithology

BIOSM 3750 Field Marine Biology and Ecology

BIOSM 3760 Marine Invertebrate Zoology (Note: Not same as BIOEE 3730)

BIOSM 3770 Diversity of Fishes

BIOSM 3820 Comparative Embryology and Life History Strategies

BIOSM 4100 Animal Social Behavior

BIOSM 4130 Research in Marine Biology

BIOSM 4450 Forensics Science for Wildlife Biologists

BIOSM 4490 Marine Botany

BIOSM 4650 Sharks: The Biology, Evolution, and Conservation of Sharks and Their Allies

BIOSM 4720 Genetics of Marine Diversity

BIOSM 4770 Marine Vertebrates

BIOEE 3730 Biology and Biodiversity of the Marine Invertebrates

BIOEE 4570 Limnology

BIOEE 4571 Limnology: Ecology of Lakes, Laboratory

BIOEE 4620 Marine Ecology

BIOEE 4780 Ecosystem Biology

BIOEE 4900 Topics in Marine Biology

BIOEE 6680 Principles of Biogeochemistry

EAS 3060 Evolution of Ancient and Modern Oceans

EAS 3220 Biogeochemistry of the Hawaiian Islands

EAS 3400 Field Study of Earth Systems

EAS 3420 Atmospheric Dynamics

EAS 3500 Dynamics of Marine Ecosystems

EAS 3530 Physical Oceanography

EAS 4060 Marine Geology and Geophysics

EAS 3750 Sedimentology and Stratigraphy

EAS 4550 Geochemistry

EAS 4620 Marine Ecology

EAS 4750 Special Topics in Oceanography

EAS 4790 Paleobiology

EAS 5050 Fluid Dynamics in the Earth Sciences

EAS 7500 Satellite Remote Sensing in Biological Oceanography

SEA 3660 Introduction to Oceanography

SEA 3670 Introduction to Maritime Studies

SEA 3680 Introduction to Nautical Science

SEA 3690 Practical Oceanography I

SEA 3700 Practical Oceanography II
 SEA 3720 Practical Oceanography III
 SEA 3780 Oceans and Climate: Oceans in the Global Carbon Cycle
 SEA 3790 Ocean Science and Public Policy
 SEA 3800 Oceanographic Field Methods
 SEA 3810 Independent Research in Oceans and Climate
 SEA 3620 Maritime History and Culture
 SEA 3710 Marine Environmental History
 SEA courses must be taken concurrently. This program is run by SEA Education Association (SEA) in Woods Hole, Mass. Contact SEA at 800 552-3633 and see www.sea.edu.

SHOALS MARINE LABORATORY (BIOSM)

G14 Stimson Hall, 255-3717

Shoals Marine Laboratory (SML) provides a unique opportunity to explore marine sciences on Appledore Island, Maine, an island noted for its biota, geology, and history. SML has established a national reputation for excellence and is North America's largest marine field station focusing on undergraduate education.

The summer population of Appledore Island is limited to one hundred people at any one time. Students and faculty literally and figuratively immerse themselves in their explorations, free from distractions common to most academic institutions. Because SML is a residential facility, a sense of community develops that makes courses and seminars at SML outstanding educational and intellectual experiences. Participants learn from and exchange ideas with a wide range of specialists whose primary interests are in marine sciences but whose perspectives often differ, providing fertile ground for lively discussions.

Credit courses at Shoals Marine Laboratory are full-time, intensive learning experiences. Courses may be taken sequentially, but **not** concurrently. A typical day combines lecture sessions, laboratory and field work, field trips to nearby islands or the mainland, and collecting and research excursions aboard the laboratory's 47-foot research vessel, *John M. Kingsbury*, or the 36-foot research vessel, *John B. Heiser*. Field experience is integral to all courses, using Appledore's extensive intertidal and subtidal zones and seabird colonies. Faculty, drawn from Cornell University, the University of New Hampshire, and other leading academic institutions, are selected based not only on their academic excellence but also on their ability to teach in the field. Many guest lecturers including engineers, coastal planners, and specialists from private industry, government, as well as the academic community visit Appledore during the season. The SML main administrative office is located at Cornell's Ithaca campus, G14 Stimson Hall. The office serves as an advising center for students interested in the marine sciences, maintains updated information on graduate study and career opportunities as well as on marine programs at other institutions.

The following marine sciences courses are currently administered by the Shoals Marine Lab. (Not all of these courses are offered each semester; consult the SML web site for current offerings: www.sml.cornell.edu.)

BIOSM 1110 A Marine Approach to Introductory Biology

Summer. 8 credits. Prerequisite: permission of instructor. Letter grades only. A four-week course for pre-freshmen at Shoals Marine Lab (SML) on Appledore Island in the Gulf of Maine. W. E. Bemis, J. B. Heiser, and D. Taylor.

Course includes daily fieldwork, boat trips, outdoor adventure, and practices for sustainable living. Intensive lectures, laboratory, and fieldwork occur in a learning environment emphasizing individual skill building, project design and execution, and collaboration with faculty and peers. We explore four major themes—ecology, behavior, development, and genomics—and connect them using examples from evolution. Social issues discussed range from global environmental change to sustainable fisheries, emerging infectious diseases, and stem cell research.

[BIOSM 1230 Ocean Sciences

Summer. 4 credits. Prerequisite: permission of instructor. Letter grades only. Next offered 2011-2012. D. Taylor.]

BIOSM 1551 Introduction to Oceanography (also EAS 1551)

Summer. 1 credit. Prerequisite: college-level science course, EAS 1540, marine science course, or permission of instructor (any of these). S-U or letter grades. B. Monger and C. Greene. For description, see EAS 1551.

BIOSM 1600 The Oceanography of the Gulf of Maine

Summer. 2 credits. Limited to 24 students. S-U or letter grades. A two-week course offered aboard a SEA vessel and at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. For more details or an application, contact SML office, G14 Stimson Hall or web site (www.sml.cornell.edu) or Sea Education Association office, P.O. Box 6, Woods Hole, MA 02543, 800-552-3633 X 770 or web site: www.sea.edu. Daily lec, lab, and fieldwork for two weeks. S. Rensselaer, and SEA and SML staff.

Exciting opportunity to explore the offshore and near-coastal environments of the Gulf of Maine for advanced high school students. Students spend 10 days aboard the Sea Education Association's sailing vessels round trip between Woods Hole, Mass., and the Isles of Shoals via Georges Bank and the Gulf of Maine. Besides operating the ship, students study the many characteristics of this unique ocean environment. Following the sea component, students spend seven days at the Shoals Marine Laboratory collecting data characteristic of the Isles of Shoals coastal environment.

[BIOSM 1610 Introduction to Marine Science

Summer. 4 credits. S-U or letter grades. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec, lab, and fieldwork for two weeks. Next offered 2011-2012.]

BIOSM 1620 Marine Environmental Science

Summer. 4 credits. Prerequisite: open to high school rising junior and senior students who have successfully completed two high school science courses. S-U or letter grades. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec, lab, and fieldwork for 14 days. M. Johnson.

Environmental studies have become an integral component of high school programs all around the country; however, opportunities to apply this course work to the marine environment are limited. Marine Environmental Science focuses on coastal marine habitats, with an emphasis on issues as they relate to global habitats and concerns. Laboratory exercises and fieldwork include explorations along Appledore Island's rocky intertidal zone and excursions to neighboring islands to observe harbor seal and seabird colonies. Offshore cruises include oceanographic sampling exercises and field trips to seabird and whale foraging grounds. Lectures and discussions expose MES students to topics ranging from fishes to fisheries, seaweeds to lobsters, and plankton to whales. Fundamental scientific research methods and equipment are introduced, and each student has the opportunity to be involved in group research projects.

BIOSM 2040 Biological Illustration

Summer. 2 credits. Prerequisite: none. S-U or letter grades. A one-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. B. Ober, C. Garrison, and J. Gibson. General discussion of scientific publishing, illustration labeling, color techniques, and printing processes. Provides the scientist or science student a chance to experience several illustration techniques with the goal of obtaining an overview of scientific and wildlife illustrations. The student may choose a single technique to explore in depth. Course size is limited so that individual attention can be emphasized.

BIOSM 2100 Boats for Biologists

Summer. 2 credits. Prerequisite: open to all undergraduate and graduate students. S-U or letter grades. A one-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. W. E. Bemis.

Marine and freshwater biologists rely on boats—small and large—for transportation, environmental sampling, data collection, and other tasks. This course offers biologists at all stages of their careers a chance to learn basic boat handling, piloting, navigation, and common sampling techniques to enhance their opportunities for research and education. This course meets all certification requirements for basic small boat handling by state-specific agencies and National Association of Boating Law Administrators.

[BIOSM 2250 Sustainability in the 21st Century

Summer. 4 credits. Prerequisite: open to all undergraduate and graduate students. Letter grades only. A two-week course offered at Shoals Marine Laboratory (SML) on Appledore Island in the Gulf of Maine. Next offered 2010-2011. Cornell, UNH, SML faculty and staff.]

BIOSM 2760 Seabird Ecology and Conservation

Summer. 2 credits. Prerequisite: one year college-level biology. S-U or letter grades. A one-week course offered at Shoals Marine Laboratory (SML) on Appledore Island in the Gulf of Maine. J. Ellis.

Combines lectures from specialists (e.g., ecologists and wildlife veterinarians) with a variety of field-based activities related to seabird ecology and conservation. Topics will include: seabird identification, behavioral studies, census techniques, population threats (e.g., fisheries bycatch, pollution), and restoration. A field trip to a nearby seabird restoration island will be included.

BIOSM 2770 Introduction to Marine Conservation Biology

Summer. 4 credits. Prerequisite: two semesters of college-level introductory biology or equivalent. S-U or letter grades. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. H. Weeks and K. Flessa.

Students will study introduction to the examination and analysis of marine biological resource conservation and management issues. Class will address principles and problems through readings, laboratory modeling exercises and lectures, including guests from the New England region, and explore potential pathways to success through readings and field trip.

BIOSM 3060 Evolution of Ancient and Modern Oceans (also EAS 3060)

Summer. 6 credits (students will have the opportunity to continue their studies during the fall semester on campus at Cornell for another 2 credits of independent study). Prerequisite: one semester of oceanography and /or marine biology or permission of instructor. Letter grades only. W. Allmon.

For description, see EAS 3060.

BIOSM 3080 Field Microbial Ecology (also BIOMI 3080)

Summer. 4 credits. Prerequisite: introductory biology or permission of instructor. S-U or letter grades. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. E. Zettler and L. A. Zettler.

The microbial world dominates the biosphere in terms of biomass, diversity, and metabolic flexibility. This course will introduce students to collecting, observing, and identifying live representatives of these fascinating microbial organisms including bacteria, protists, fungi, and microscopic animals. Taxonomy and ecology of the basic groups of microorganisms will be covered while students learn to collect in the field for observation, experimentation and isolation.

[BIOSM 3090 Coastal Ecology and Bioclimates

Summer. 4 credits. Prerequisite: one year college-level biology; background preferred in physics/physical geography. S-U or letter grades. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. For more details or an application, contact SML office, G14 Stimson Hall. Daily lec, lab, and fieldwork for two weeks. Next offered 2010–2011. G. Courtin.]

[BIOSM 3100 Marine Symbiosis

Summer. 4 credits. Prerequisite: one full year college-level biology. Recommended: background in microbiology or cell biology. S-U or letter grades. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lecs and fieldwork for two weeks. Next offered 2011–2012. SML faculty.]

BIOSM 3110 Science Writing

Summer. 2 credits. Prerequisite: introductory-level science course. One-week course offering students an introduction to science writing at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. S-U or letter grades. C. Zimmer.

Students will learn about the business of science writing (including career opportunities in newspapers, television, and the Internet). They will also have the opportunity to become familiar with the craft of making complex scientific research understandable and exciting for the general public. Students should be prepared to complete several short-deadline writing exercises.

BIOSM 3120 Biology of the Lobster

Summer. 2 credits. Prerequisite: one year of college level biology. S-U or letter grades. A one-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. J. Factor.

An introduction to the biology of the American lobster, *Homarus americanus*. The course will include an overview of this ecologically and economically important species, as well as cover several major topics in depth, each taught by a lobster biologist expert in that field. Topics may include life history, larval development and metamorphosis, anatomy, physiological adaptation, fisheries and fishing methods, feeding mechanisms, ecology, and behavior. Course will include lecture, laboratory, discussion, and the natural field environment of Appledore Island.

[BIOSM 3200 Functional Morphology of Marine Organisms

Summer. 4 credits. Prerequisite: one year introductory biology or one semester introductory biology, general zoology, and general botany. Letter grades only. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Next offered 2010–2011. F. Fish.]

BIOSM 3210 Anatomy and Function of Marine Vertebrates

Summer. 4 credits. Prerequisite: college-level introductory biology or equivalent. S-U or letter grades. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. W. E. Bemis, EE&B faculty, and F. Fish.

Course includes introductions to vertebrate systematics, paleontology and evolution, vertebrate development, and functional morphology. Students will do comparative study of the anatomy of marine vertebrates, including: hagfishes; lampreys; sharks, skates, rays and chimaeras; ray finned fishes; lobe-finned fishes; marine reptiles, birds, and mammals. All 10 organ systems of vertebrates will be detailed in lecture and laboratory exercises. Dissection is required. Grades will be based on quizzes, essay exams, practical exams, class participation, and research projects.

BIOSM 3220 Ecology of Biological Invasions

Summer. 4 credits. Prerequisite: full year (two semesters) of introductory biology. One-week field course examining marine and terrestrial invasions in the field using facilities at Shoals Marine Laboratory (SML) on Appledore Island in the Gulf of Maine and at Creek Farm in Portsmouth, N.H. S-U or letter grades. R. Hadlock Seeley and J. Dijkstra.

The course includes both a thorough review of theory of invasions (and their ecological and evolutionary sequelae) and field time with invited experts in invasive insect, plant, marine invertebrate and bird species.

BIOSM 3290 Ecology of Animal Behavior (also BIONB 3290)

Summer. 4 credits. Prerequisite: one year introductory college biology. Recommended: course work in ecology, psychology, or behavior. S-U or letter grades. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec, lab, and fieldwork for two weeks. H. Weeks, J. Waldvogel, and W. Kimler.

The ecological significance of behaviors of coastal organisms, with emphasis on field and laboratory research methods. Lectures and readings address the major subareas of behavior (communication, orientation, social behavior, foraging, predator avoidance, and sensory mechanisms). Each student engages in short-term behavioral observation and prepares a research proposal for studying a problem within the course subject area.

BIOSM 3640 Field Marine Science (FMS)

Summer. 8 credits. Prerequisite: one year college-level biology. S-U or letter grades. A four-week course offered twice each summer at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Students may not take FMS after taking FMBE (BIOSM 3750). Daily lec, lab, and fieldwork for four weeks. Three core faculty members assisted by up to 15 visiting lecturers, including representatives of governmental agencies. J. Factor, R. Zechman, S. Morris, W. E. Bemis, and E. Zettler.

Designed for the student who desires an initial overview of the marine sciences, this course emphasizes living material in natural habitats. Most of the course work is concerned with the biology of intertidal plants and animals, biological oceanography, ichthyology, and fisheries. Attention is also given to introductory physical and chemical oceanography and marine geology. Marine ecology and the effects of human activity on the marine environment are included. Students apply this knowledge by conducting a transect study toward the end of the course. FMS places emphasis on ichthyology, fisheries biology, general oceanography (biological, physical, and chemical), and marine geology. FMBE (BIOSM 3750) places an additional emphasis on ecology, especially in the intertidal zone; ecological, evolutionary and physiological adaptations of marine organisms; and field experiments.

BIOSM 3650 Underwater Research

Summer. 4 credits. Prerequisites: one year college-level biology, recognized SCUBA certification, and medical exam. S-U or letter grades. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec and fieldwork for two weeks.

J. Coyer, J. Grabowski, and E. Calvert.

Covers the philosophy of research, hypothesis testing and experimental design, sampling methods, various underwater techniques, diving physics and physiology, and use of dive tables. Emphasizes subtidal ecological research. Requirements include critical evaluation of several journal articles and production of a research proposal.

BIOEE 3730 Biology and Biodiversity of the Marine Invertebrates

Fall (but course must be taken previous summer at Shoals Marine Laboratory [SML]), three-week, full-time course. 5 credits (students enroll for credit during fall semester). Limited to 24 students. Prerequisites: one year introductory biology for majors; permission of faculty because off campus. Letter grades only. Daily and evening lec, lab, and fieldwork. Offered alternate years. C. D. Harvell.

BIOSM 3740 Field Ornithology

Summer. 4 credits. Prerequisite: one year college-level biology. S-U or letter grades. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec and fieldwork for two weeks. D. Bonter.

Introduction to field ornithology focusing on the biology, ecology, and behavior of the avifauna on the Isles of Shoals. Focuses on fieldwork designed to observe and study many concepts frequently taught in the classroom setting including territoriality, breeding biology, and survivorship. Students learn and apply numerous ornithological field methods including various census techniques, territory mapping, banding, behavioral observations, and creating a field notebook.

BIOSM 3750 Field Marine Biology and Ecology (FMBE)

Summer. 8 credits. Prerequisites: one full year college-level biology. S-U or letter grades. A four-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec, lab, and fieldwork for four weeks. K. A. Miller and C. Siddon.

Designed for students seeking an introduction to the marine sciences and marine ecology; FMBE emphasizes fieldwork in natural habitats. Examines aspects of the biology and ecology of marine organisms, including intertidal plants and invertebrates, fishes, marine mammals and birds, biological oceanography, and human impacts on the marine environment. FMBE places a special emphasis on the ecology of the intertidal zone and ecological, evolutionary, and physiological adaptations of marine organisms. Students may not take FMBE after taking FMS (BIOSM 3640).

[BIOSM 3760 Marine Invertebrate Zoology

Summer. 6 credits. Prerequisite: one year introductory biology and permission of instructors. Students may not take BIOSM 3760 after taking BIOEE 3730. S-U or letter grades. A three-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec, lab, and fieldwork for three weeks. Offered alternate years; next offered 2011-2012. J. Morin.]

BIOSM 3770 Diversity of Fishes

Summer. 6 credits. Prerequisite: one full year college-level biology. Recommended: background in vertebrate biology. S-U or letter grades. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lecs and fieldwork for two weeks. B. Collette.

Intensive lecture, laboratory, and field course. Lectures cover the basic anatomy and physiology of fishes with examples drawn from a wide variety of fishes from throughout the world. The course emphasizes the diversity of fishes in two aspects, diversity of evolutionary solutions to problems faced by fishes and the great diversity of different types of fishes that inhabit the world. Laboratory exercises cover the anatomy and osteology of teleost fishes and identification of local species. Each student selects a different local species of teleost fish to study and dissect and prepares a comprehensive paper on its morphology, soft anatomy, and osteology.

[BIOSM 3820 Comparative Embryology and Life History Strategies

Summer. 2 credits. Prerequisite: introductory biology or equivalent. S-U or letter grades. A one-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Next offered 2010-2011. W. E. Bemis, EE&B faculty.]

[BIOSM 4100 Animal Social Behavior

Summer. 2 credits. Prerequisite: introductory biology. Letter grades only. A one-week course offered at Shoals Marine Laboratory (SML) on Appledore Island in the Gulf of Maine. Next offered 2010-2011. T. Seeley, P. Sherman, and J. Sherman Sherman.]

BIOSM 4130 Research in Marine Biology

Summer. 4 credits. Prerequisite: one year college-level biology. Recommended: experience in ecology or physiology. S-U or letter grades. A three-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec, lab, and fieldwork for two weeks. D. Taylor, D. Fudge, A. Todgham, and J. Lim.

A hands-on course in which students explore the marine environment around Appledore Island via field and laboratory experiments of their own design. This course is unique in that students learn practical skills that are required of all biologists, such as generating hypotheses, experimental design, data collection, statistical analysis, group decision-making, writing scientific papers, and communicating results to others. The class will work together on several experiments inspired by student observations, primary literature, lectures, and data collected by previous classes. Phenomena investigated in previous years include: predator-prey interactions, vertical migration in zooplankton,

biomechanical design, foraging behavior, photosynthesis, and adaptation to intertidal stressors such as desiccation, temperature, and wave action. Students will gain practical experience with laboratory, field, and remote sensing equipment, and may work with a diverse range of marine organisms including vertebrates, invertebrates and algae. Each student will take responsibility for writing up the results from one experiment and will present the results in a scientific symposium at the end of the course. This course is highly recommended for undergraduates interested in independent research or considering graduate education in biology, as well as science educators seeking experience in inquiry-based learning.

BIOSM 4450 Forensic Science for Wildlife Biologists (also VTMED 6435)

Summer. 2 credits. Prerequisite: satisfactory completion of college-level course in biology, ecology, or marine science. S-U or letter grades. A one-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. W. Lord, R. Haebler, R. Kenney, W. Rodriguez, and I. Sidor.

Forensic science represents the unique merging of scientific insight and the law. Forensic Science for Marine Biologists provides a field-oriented introduction to the forensic science domain and the utilization of marine biology within the justice system. Students receive comprehensive instruction concerning the recognition, documentation, collection, and preservation of physical evidence. Additionally, students develop practical incident response, scene management, and forensic teamwork skills.

[BIOSM 4490 Marine Botany

Summer. 4 credits. Prerequisite: BIOSM 3640 or one year introductory biology. S-U or letter grades. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec, lab, and fieldwork for two weeks. Next offered 2010-2011. R. Zechman.]

BIOSM 4650 Sharks: The Biology, Evolution, and Conservation of Sharks and Their Allies

Summer. 3 credits. Prerequisite: vertebrates or comparative anatomy and ichthyology or permission of SML director. S-U or letter grades. A one-and-a-half-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. D. Dagit and W. E. Bemis.

The last 30 years have produced an explosion of new information on the biology of the approximately 1,000 living species of sharks, skates, rays, and chimaeras, which collectively make up the group Chondrichthyes. This course will cover advanced topics in the evolution, diversity, anatomy, functional morphology, neurobiology, sensory systems, behavior, reproduction, development, and conservation of cartilaginous fishes.

BIOSM 4720 Genetics of Marine Diversity

Summer. 4 credits. Prerequisite: one year introductory biology. Recommended: genetics and/or cell biology with laboratory components. Helpful: evolutionary biology, ecology vertebrate/invertebrate zoology. Letter grades only. A two-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. A. Shedlock.

An introduction to basic concepts in systematic biology, evolutionary genetics, molecular ecology, and conservation biology emphasizing the natural history of marine organisms. Students integrate field sampling techniques, taxonomy, and curation of specimens from Appledore Island and surrounding waters with molecular diagnostics completed in the laboratory. Standard methods for DNA purification, amplification, sequencing, and genotyping are used to address questions about population structure, kinship, and species phylogeny.

[BIOSM 4770 Marine Vertebrates

Summer. 6 credits. Prerequisites: vertebrate biology course or equivalent course at level from which applicant can demonstrate knowledge of basic vertebrate anatomy, physiology, and systematics, or permission of instructor. S–U or letter grades. A three-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec, lab, and fieldwork for three weeks. Next offered 2010–2011. J. Heiser.]

[BIOSM 4950 Research Methods in Marine Biology

Summer. 1 credit. Corequisite: BIOSM 4990 or permission of instructor. Primarily for undergraduates. An eight-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Weekly sem for eight weeks. Next offered 2011–2012. SML faculty.]

BIOSM 4990 Research in Biology

Summer. Variable credit; 2 credits per seven days on site. A three-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. SML faculty.

Section A: Independent Biological

Research: Independent study with a member of the Shoals Marine Laboratory core faculty, based on student faculty interest and available facilities. A short proposal of research must be sent with application materials.

[BIOSM 6500 Field Marine Ecology and Environmental Science for Teachers

Summer. 2 credits. Prerequisites: one year college-level biology. Recommended: teaching experience. A one-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec and fieldwork for one week. Next offered 2011–2012. SML faculty.]

[BIOSM 6990 Research in Biology for Teachers

Summer. 2 credits per week. Prerequisite: BIOSM 6500. One-week course offered at Shoals Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Next offered 2011–2012.]

SEA Semester

Sea Education Association (SEA) offers a semester-length sequence of courses designed to provide college undergraduates with a thorough academic, scientific, and practical understanding of the sea. *This sequence is repeated approximately once every two months throughout the year.* Students spend the first half of SEA Semester (a six-week shore component) in Woods Hole, Mass., receiving instruction in oceanography, nautical science, and maritime studies. The second half of SEA Semester (a six-week sea component) is spent at sea aboard the SSV *Robert C. Seamans* or

the SSV *Corwith Cramer*. Enrollment is open to both men and women judged capable of benefiting from SEA semester; a student must have successfully completed **at least one college-level laboratory science course** (or its equivalent) in order to be admitted to SEA Semester or SEA Summer Session. **No prior sailing experience is necessary.** Cornell students enrolled in the SEA Semester must take the entire sequence.

For more information, contact Sea Education Association, P.O. Box 6, Woods Hole, MA 02543 or call 800–552–3633 ext. 770. Program costs are to be paid in place of regular Cornell tuition and fees.

Instructors for the SEA Semester include faculty of the Sea Education Association and the Woods Hole Oceanographic Institution and others.

SEA Basic Semester

SEA 3660 Introduction to Oceanography
3 credits. Corequisites: BIOSM 3670 and 3680.

Survey of the characteristics and processes of the global ocean. Introduces oceanographic concepts and develops them from their bases in biology, physics, chemistry, and geology. Provides a broad background in oceanography with special attention to areas pertinent to the subsequent cruise. Guest lecturers from the Woods Hole research community interpret current trends and activities in this rapidly evolving field. Students develop individual projects to be carried out at sea.

SEA 3670 Introduction to Maritime Studies

3 credits. Corequisites: BIOSM 3660 and 3680.

Interdisciplinary consideration of our relationship with the marine environment. Covers the elements of maritime history, law, literature, and art necessary to appreciate our marine heritage and to understand the political and economic problems of contemporary maritime affairs.

SEA 3680 Introduction to Nautical Science

3 credits. Corequisites: BIOSM 3660 and 3670.

An introduction to the technologies of operation at sea. The concepts of navigation (piloting, celestial and electronic), naval architecture, ship construction, marine engineering systems, and the physics of sail are taught from their bases in astronomy, mathematics, and physics. Provides the theoretical foundation for the navigation, seamanship, and engineering that students employ at sea.

SEA 3690 Practical Oceanography I

4 credits. Prerequisite: BIOSM 3660.

Theories and problems raised in the shore component are tested in the practice of oceanography at sea. Students are introduced to the tools and techniques of the practicing oceanographer. During lectures and watch standing, students are instructed in the operation of basic oceanographic equipment; in the methodologies involved in the collection, reduction, and analysis of oceanographic data; and in the attendant operations of a sailing oceanographic research vessel.

SEA 3700 Practical Oceanography II

4 credits. Prerequisites: BIOSM 3680 and 3690.

Building on the experience of Practical Oceanography I, students assume increasing responsibility for conducting oceanographic research and overseeing operations of the vessel. The individual student is ultimately responsible directly to the chief scientist and the master of the vessel for the safe and orderly conduct of research activities and related operations of the vessel. Each student undertakes an individual research project designed during the shore component.

SEA 3720 Practical Oceanography III

Summer. 3 credits. Prerequisites: BIOSM 3660, 3670, and 3680.

Theories and problems raised in class are tested in the practice of oceanography at sea. During lectures and watch standing, students are instructed in the operation of basic oceanographic equipment, in the methodologies involved in the collection, analysis, and reduction of oceanographic data, and in the attendant operations of sailing an oceanographic research vessel. Group research projects are completed.

SEA Oceans and Climate Semester

SEA 3680 Introduction to Nautical Science

SEA 3780 Oceans and Climate: Oceans in the Global Carbon Cycle

Fall, spring. 4 credits. Prerequisite: 3 lab science courses or permission of instructor. SML faculty.

This course examines the role of the oceans in the climate system, addressing topics such as the global carbon cycle, the thermohaline circulation, and aspects of global change including warming and sea level rise.

SEA 3790 Ocean Science and Public Policy (HA)

Fall, spring. 3 credits. SEA faculty.

This course seeks to provide students with a fundamental understanding of the intersection between climate change and governmental policy and the interrelationship between science and governmental policy. After an introduction to the development of maritime law and sovereignty on the high seas, students will examine why societies funded oceanic research.

SEA 3800 Oceanographic Field Methods

Fall, spring. 3 credits. Prerequisite: successful completion of BIOSM 3780. SEA faculty.

This course introduces students to all aspects of oceanographic fieldwork. Students learn practical skills in the operating principles and safe deployment of oceanographic instrumentation. Skills acquired enable students to carry out an independent research project.

SEA 3810 Independent Research in Oceans and Climate

Fall, spring. 4 credits. Prerequisite: successful completion of BIOSM 3780. SEA faculty.

This course provides upper-level study focused on oceanography and climate, including the design and completion of an independent research project that is comparable in scope to an undergraduate senior research thesis.

SEA: Documenting Change in the Caribbean Semester**SEA 3620 Maritime History and Culture (CA) (HA)**

Fall, spring. 4 credits. SEA faculty.

In this course, students will explore political, cultural and social changes in the Caribbean since just before Europeans arrived at the end of the 15th century. Student will see how the physical nature of the region has influenced patterns of settlement and development and the impact of European expansion.

SEA 3660 Practical Oceanography I**SEA 3680 Introduction to Nautical Science****SEA 3700 Practical Oceanography II****SEA 3710 Marine Environmental History (CA) (LA)**

Fall, spring. 4 credits. SEA faculty.

This course is designed to explore the interaction of ecological factors in ocean, coastal and island environments; the impact of human actions on those environments; and the need for local, regional and international responses and strategies to mitigate and manage that impact.

FACULTY ROSTER**New York State College of Agriculture and Life Sciences**

Adler, Craig K., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior
 Agrawal, Anurag, Ph.D., U. of California, Davis. Assoc. Prof., Ecology and Evolutionary Biology/Entomology
 Alani, Eric E., Ph.D., Harvard U. Assoc. Prof., Molecular Biology and Genetics
 Anderson, John M., Ph.D., New York U. Prof. Emeritus, Molecular Biology and Genetics
 Angert, Esther R., Ph.D., Indiana U. Assoc. Prof., Microbiology
 Barbash, Daniel A., Ph.D., U. of California, Berkeley. Asst. Prof., Molecular Biology and Genetics
 Bates, David M., Ph.D., U. of California, Los Angeles. Prof. Emeritus, Plant Biology (Bailey Hortorium)
 Bemis, William E., Ph.D., U. of California, Berkeley. Prof., Ecology and Evolutionary Biology/Shoals Marine Laboratory
 Bruns, Peter J., Ph.D., U. of Illinois. Prof. Emeritus, Molecular Biology and Genetics
 Cade, Thomas J., Ph.D., U. of California, Los Angeles. Prof. Emeritus, Ecology and Evolutionary Biology
 Calvo, Joseph M., Ph.D., Washington State U. William T. Keeton Professor Emeritus in Biological Sciences, Molecular Biology and Genetics
 Chabot, Brian F., Ph.D., Duke U. Prof., Ecology and Evolutionary Biology
 Clayton, Roderick K., Ph.D., California Inst. of Technology. Prof. Emeritus, Plant Biology
 Crepet, William L., Ph.D., Yale U. Prof., Plant Biology (Bailey Hortorium)*
 Davies, Peter J., Ph.D., U. of Reading (England). Prof., Plant Biology
 Davis, Jerrold I., Ph.D., U. of Washington. Assoc. Prof., Plant Biology (Bailey Hortorium)
 Dhondt, André A., Ph.D., Ghent State U. (Belgium). Edwin H. Morgens Professor of

Ornithology, Ecology and Evolutionary Biology/Laboratory of Ornithology
 Dondero, Norman C., Ph.D., Cornell U. Prof. Emeritus, Microbiology
 Doyle, Jeffrey J., Ph.D., Indiana U. Prof., Plant Biology (Bailey Hortorium)
 Dress, William J., Ph.D., Cornell U. Prof. Emeritus, Plant Biology (Bailey Hortorium)
 Eisner, Thomas, Ph.D., Harvard U. Jacob Gould Schurman Professor Emeritus, Neurobiology and Behavior*
 Emlen, Stephen T., Ph.D., U. of Michigan. Jacob Gould Schurman Professor Emeritus, Neurobiology and Behavior
 Feeny, Paul P., Ph.D., Oxford U. (England). Prof., Ecology and Evolutionary Biology
 Fitzpatrick, John W., Ph.D., Princeton U. Prof., Ecology and Evolutionary Biology/Laboratory of Ornithology
 Flecker, Alexander S., Ph.D., U. of Maryland. Assoc. Prof., Ecology and Evolutionary Biology
 Fox, Thomas D., Ph.D., Harvard U. Prof., Molecular Biology and Genetics
 Fromme, Joseph C., Ph.D., Harvard U. Asst. Prof., Molecular Biology and Genetics
 Ghiorse, William C., Ph.D. Rensselaer Polytechnic Inst. Prof., Microbiology
 Gibson, Jane, Ph.D., U. of London (England). Prof. Emeritus, Molecular Biology and Genetics
 Goldberg, Michael L., Ph.D., Stanford U. Prof., Molecular Biology and Genetics
 Hanson, Maureen R., Ph.D., Harvard U. Prof., Molecular Biology and Genetics/Liberty
 Hyde, Prof., Plant Biology
 Harrison, Richard G., Ph.D., Cornell U. Prof., Ecology and Evolutionary Biology
 Harris-Warrick, Ronald M., Ph.D., Stanford U. Prof., Neurobiology and Behavior
 Harvell, C. Drew, Ph.D., U. of Washington. Prof., Ecology and Evolutionary Biology
 Hay, Anthony, Ph.D., U. of California. Assoc. Prof., Microbiology
 Helmann, John D., Ph.D., U. of California, Berkeley. Prof., Microbiology
 Henry, Susan, Ph.D., U. of California, Berkeley. Prof., Molecular Biology and Genetics and Dean CALS
 Hopkins, Carl D., Ph.D., Rockefeller U. Prof., Neurobiology and Behavior
 Howarth, Robert W., Ph.D., Massachusetts Inst. of Technology/Woods Hole Oceanographic Institution
 David R. Atkinson Professor of Ecology and Environmental Biology, Ecology and Evolutionary Biology
 Hua, Jian, Ph.D., California Inst. of Technology. Asst. Prof., Plant Biology
 Ingram, John W., Ph.D., U. of California, Berkeley. Prof. Emeritus, Plant Biology (Bailey Hortorium)
 Jagendorf, André T., Ph.D., Yale U. Liberty Hyde Bailey Professor of Plant Physiology Emeritus, Plant Biology
 Kemphues, Kenneth J., Ph.D., Indiana U. Prof., Molecular Biology and Genetics
 Kessler, André, Ph.D., Max Planck Inst. for Chemical Ecology/Friedrich Schiller U. of Jena (Germany). Asst. Prof., Ecology and Evolutionary Biology/Boyce Thompson Inst. for Plant Research
 Kingsbury, John M., Ph.D., Harvard U. Prof. Emeritus, Plant Biology
 Kraus, W. Lee, Ph.D., U. of Illinois. Assoc. Prof., Molecular Biology and Genetics
 Ley, Ruth E., Ph.D., U. of Colorado. Asst. Prof., Microbiology

Lis, John T., Ph.D., Brandeis U. Barbara McClintock Professor of Molecular Biology and Genetics
 Lovette, Irby J., Ph.D., U. of Pennsylvania. Assoc. Prof., Ecology and Evolutionary Biology/Laboratory of Ornithology
 Luckow, Melissa A., Ph.D., U. of Texas, Austin. Assoc. Prof., Plant Biology (Bailey Hortorium)
 MacDonald, Russell E., Ph.D., U. of Michigan. Prof. Emeritus, Molecular Biology and Genetics
 Madsen, Eugene L., Ph.D., Cornell U. Assoc. Prof., Microbiology
 Marks, Peter L., Ph.D., Yale U. Prof. Emeritus, Ecology and Evolutionary Biology
 McCune, Amy R., Ph.D., Yale U. Prof., Ecology and Evolutionary Biology
 Morin, James G., Ph.D., Harvard U. Prof., Ecology and Evolutionary Biology
 Mortlock, Robert P., Ph.D., U. of Illinois. Prof. Emeritus, Microbiology
 Nasrallah, June B., Ph.D., Cornell U. Prof., Plant Biology
 Nasrallah, Mikhail E., Ph.D., Cornell U. Prof., Plant Biology
 Niklas, Karl J., Ph.D., U. of Illinois. Prof., Plant Biology
 Nixon, Kevin C., Ph.D., U. of Texas, Austin. Assoc. Prof., Plant Biology (Bailey Hortorium)
 Owens, Thomas G., Ph.D., Cornell U. Assoc. Prof., Plant Biology
 Paolillo, Dominick J., Jr., Ph.D., U. of California, Davis. Prof. Emeritus, Plant Biology
 Parthasarathy, Mandayam V., Ph.D., Cornell U. Prof. Emeritus, Plant Biology
 Peters, Joseph, Ph.D., U. of Maryland. Assoc. Prof., Microbiology
 Raguso, Robert A., Ph.D., U. of Michigan. Assoc. Prof., Neurobiology and Behavior
 Reeve, H. Kern, Ph.D., Cornell U. Prof., Neurobiology and Behavior
 Roberts, Jeffrey W., Ph.D., Harvard U. Robert J. Appel Professor of Cellular and Molecular Biology, Molecular Biology and Genetics
 Rodriguez, Eloy, Ph.D., U. of Texas. Prof., Plant Biology (Bailey Hortorium)
 Root, Richard B., Ph.D., U. of California, Berkeley. Prof. Emeritus, Ecology and Evolutionary Biology/Entomology
 Rose, Jocelyn, Ph.D., U. of California, Davis. Assoc. Prof., Plant Biology
 Scanlon, Michael, Ph.D., Iowa State U. Assoc. Prof., Plant Biology
 Seeley, Jr., Harry W., Ph.D., Cornell U. Prof. Emeritus, Microbiology
 Shalloway, David I., Ph.D., Massachusetts Inst. of Technology. Greater Philadelphia Prof., Molecular Biology and Genetics
 Shapleigh, James P., Ph.D., U. of Georgia. Assoc. Prof., Microbiology
 Smolka, Marcus B., Ph.D., State U. of Campinas (Brazil). Asst. Prof., Molecular Biology and Genetics
 Tye, Bik-Kwoon, Ph.D., Massachusetts Inst. of Technology. Prof., Molecular Biology and Genetics
 Uhl, Charles H., Ph.D., Cornell U. Prof. Emeritus, Plant Biology
 Uhl, Natalie W., Ph.D., Cornell U. Prof. Emeritus, Plant Biology (Bailey Hortorium)
 Van Wijk, Klaas J., Ph.D., Groningen U. (The Netherlands). Assoc. Prof., Plant Biology
 Vogt, Volker M., Ph.D., Harvard U. Prof., Molecular Biology and Genetics
 Walcott, Charles, Ph.D., Cornell U. Prof. Emeritus, Neurobiology and Behavior

Wayne, Randy O., Ph.D., U. of Massachusetts. Assoc. Prof., Plant Biology
 Winans, Stephen C., Ph.D., Massachusetts Inst. of Technology. Prof., Microbiology
 Winkler, David W., Ph.D., U. of California, Berkeley. Prof., Stephen H. Weiss Presidential Fellow, Ecology and Evolutionary Biology
 Zahler, Stanley A., Ph.D., U. of Chicago. Prof. Emeritus, Molecular Biology and Genetics
 Zinder, Stephen H., Ph.D., U. of Wisconsin. Prof., Microbiology

Other Teaching Personnel

Blankenship, James E., M.S., Cornell U. Sr. Lec., Molecular Biology and Genetics
 Calvo, Rita A., Ph.D., Cornell U. Courtesy Sr. Lec., Molecular Biology and Genetics
 Chen, Kuei-chiu, Ph.D., New York U. Lec., Neurobiology and Behavior
 Ely, Susan, Ph.D., Tufts U. Sr. Lec., Molecular Biology and Genetics
 Hester, Laurel, Ph.D., U. Michigan. Lec., Neurobiology and Behavior
 Lorr, Nancy, Ph.D., U. of Oregon. Lec., Physiology
 McGuire, Betty A., Ph.D., U. of Massachusetts. Sr. Lec., Ecology and Evolutionary Biology
 Merkel, Susan, M.S., Cornell U. Sr. Lec., Microbiology
 Nivison, Helen T., Ph.D., U. of California, Davis. Sr. Lec., Molecular Biology and Genetics
 Rehkugler, Carole M., M.S., Cornell U. Sr. Lec., Microbiology
 Silva, Thomas, Ph.D., Cornell U. Sr. Lec., Plant Biology
 Southard, Laurel E., M.S., Tulane U. Lec., Undergraduate Biology

Joint Appointees

Bloom, Stephen E., Prof., Veterinary/Microbiology and Immunology
 Bradbury, Jack, Prof., Neurobiology and Behavior/Library of Natural Sounds
 Brutnell, Thomas, Prof., Plant Breeding/Plant Biology
 Doyle, Jeffrey J., Prof., Plant Biology (Bailey Hortorium)/Plant Biology General
 Foote, Robert H., Jacob Gould Schurman Prof. Emeritus, Animal Science/Physiology
 Giovannoni, James G., Adjunct Asst. Prof., USDA Science and Education Administration/Plant Biology
 Hanson, Maureen, Prof., Molecular Biology and Genetics/Plant Biology
 Hrazdina, Geza, Prof. Emeritus, Food Science and Technology Geneva/Plant Biology Ithaca
 Jander, Georg, Adjunct Asst. Prof., Boyce Thompson Inst./Plant Biology
 Kochian, Leon V., Adjunct Prof., USDA Science and Education Administration/Plant Biology
 Koenig, Walter D., Sr. Scientist, Laboratory of Ornithology
 Korf, Richard P., Prof. Emeritus, Plant Pathology/Plant Biology (Bailey Hortorium)
 Kresovich, Stephen, Prof., Plant Breeding/Plant Biology
 Lee, Ji-Young, Adjunct Prof., Boyce Thompson Institute/Plant Biology
 Liebherr, James K., Assoc. Prof., Entomology/Plant Biology (Bailey Hortorium)
 McClure, Polley A., Prof., Information Technologies/Ecology and Evolutionary Biology
 McCouch, Susan R., Assoc. Prof., Plant Breeding/Plant Biology
 Pimentel, David, Prof. Emeritus, Entomology/Ecology and Evolutionary Biology

Rossmann, Michael J., Adjunct Prof., Purdue U./Molecular Biology and Genetics
 Stern, David B., Adjunct Prof., Boyce Thompson Institute/Plant Biology
 Tanksley, Steven, Prof., Plant Breeding/Liberty Hyde Bailey Prof., Plant Biology
 Thaler, Jennifer S., Assoc. Prof., Entomology/Ecology and Evolutionary Biology
 Thompson, John F., Adjunct Prof., USDA Science and Education Administration/Plant Biology
 Vehrencamp, Sandra, Prof., Neurobiology and Behavior/Library of Natural Sounds
 Wang, Haiyang, Adjunct Asst. Prof., Boyce Thompson Inst./Plant Biology

College of Arts and Sciences

Adkins-Regan, Elizabeth, Ph.D., U. of Pennsylvania. Prof., Neurobiology and Behavior/Psychology
 Aquadro, Charles F., Ph.D., U. of Georgia. Charles A. Alexander Professor of Biological Sciences, Molecular Biology and Genetics/Ecology and Evolutionary Biology
 Bass, Andrew H., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior
 Blackler, Antonie W., Ph.D., U. of London (England). Prof., Molecular Biology and Genetics
 Booker, Ronald, Ph.D., Princeton U. Assoc. Prof., Neurobiology and Behavior
 Bretscher, Anthony P., Ph.D., Leeds U. (England). Prof., Molecular Biology and Genetics and Assoc. Dir., Inst. of Cell and Molecular Biology
 Brown, William J., Ph.D., U. of Texas Health Science Center, Dallas. Prof., Molecular Biology and Genetics
 Clark, Andrew G., Ph.D., Stanford U. Jacob Gould Schurman Professor of Population Genetics, Molecular Biology and Genetics/Ecology and Evolutionary Biology
 Chuang, Huai-hu, Ph.D., U. of California. Asst. Prof., Molecular Physiology
 Deitcher, David, Ph.D., Harvard Medical School. Assoc. Prof., Neurobiology and Behavior
 Ellner, Stephen P., Ph.D., Cornell U. Prof., Ecology and Evolutionary Biology
 Emr, Scott, Ph.D., Harvard U. Frank H. T. Rhodes Class of '56 Endowed Director of the new Cornell Institute of Cell and Molecular Biology
 Feigenson, Gerald W., Ph.D., California Inst. of Technology. Prof., Molecular Biology and Genetics
 Fetcho, Joseph R., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior
 Finlay, Barbara, Ph.D., Massachusetts Inst. of Technology. Prof., Psychology
 Garcia Garcia, Maria J., Ph.D., U. Autonoma de Madrid Spain. Asst. Prof., Molecular Biology and Genetics
 Geber, Monica A., Ph.D., U. of Utah. Assoc. Prof., Ecology and Evolutionary Biology
 Gibson, Quentin H., Ph.D./D.Sc., Queen's U. (Northern Ireland). Greater Philadelphia Professor Emeritus in Biological Sciences, Molecular Biology and Genetics
 Goodale, Christine L., Ph.D., U. of New Hampshire. Asst. Prof., Ecology and Evolutionary Biology
 Greene, Harry W., Ph.D., U. of Tennessee. Prof., Ecology and Evolutionary Biology
 Hairston, Nelson G., Jr., Ph.D., U. of Washington. Frank H. T. Rhodes Professor of Environmental Science, Ecology and Evolutionary Biology
 Halpern, Bruce P., Ph.D., Brown U. Prof., Neurobiology and Behavior/Psychology

Heppel, Leon A., Ph.D., U. of California, Berkeley. Prof. Emeritus, Molecular Biology and Genetics
 Hess, George P., Ph.D., U. of California, Berkeley. Prof., Molecular Biology and Genetics
 Hinkle, Peter C., Ph.D., New York U. Prof., Molecular Biology and Genetics
 Howland, Howard C., Ph.D., Cornell U. Prof., Neurobiology and Behavior/Biomedical Sciences
 Hoy, Ronald R., Ph.D., Stanford U. Merksamer Prof., Neurobiology and Behavior
 Huffaker, Tim C., Ph.D., Massachusetts Inst. of Technology. Prof., Molecular Biology and Genetics
 Ke, Ailong, Ph.D., Johns Hopkins U. School of Medicine. Asst. Prof., Molecular Biology and Genetics
 Kennedy, Kenneth A. R., Ph.D., U. of California, Berkeley. Prof. Emeritus, Ecology and Evolutionary Biology
 Lee, Siu Sylvia, Ph.D., Baylor Coll. of Medicine. Asst. Prof., Molecular Biology and Genetics
 Linster, Christine, Ph.D., Pierre and Marie Curie U. Assoc. Prof., Neurobiology and Behavior
 Liu, Jun Kelly, Ph.D., Cornell U. Assoc. Prof., Molecular Biology and Genetics
 McCobb, David, Ph.D., U. of Iowa. Assoc. Prof., Neurobiology and Behavior
 MacDonald, June M. Fessenden, Ph.D., Tufts U. Assoc. Prof. Emeritus, Molecular Biology and Genetics/Program on Science, Technology, and Society
 Mao, Yuxin, Ph.D., Baylor College of Medicine. Asst. Prof., Molecular Biology and Genetics
 Nicholson, Linda, Ph.D., Florida State U. Assoc. Prof., Molecular Biology and Genetics
 Pleiss, Jeffrey, Ph.D., U. of Colorado. Asst. Prof., Molecular Biology and Genetics
 Power, Alison G., Ph.D., U. of Washington. Prof., Ecology and Evolutionary Biology/Science and Technology Studies
 Provine, William B., Ph.D., U. of Chicago. Andrew H. and James S. Tisch Distinguished University Professor, Ecology and Evolutionary Biology/History
 Schimenti, John C., Ph.D., U. of Cincinnati. Prof., Molecular Biology and Genetics, and Dir., Vertebrate Genomics
 Seeley, Thomas D., Ph.D., Harvard U. Prof., Neurobiology and Behavior
 Shaw, Kerry L., Ph.D., Washington U., St. Louis. Prof., Neurobiology and Behavior
 Sherman, Paul W., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior
 Sparks, Jed P., Ph.D., Washington State U. Assoc. Prof., Ecology and Evolutionary Biology
 Tumber, Tudorita, Ph.D., U. of Illinois, Urbana-Champaign. Asst. Prof., Molecular Biology and Genetics
 Turgeon, Robert, Ph.D., Carleton U. (Canada). Prof., Plant Biology
 Wallace, Bruce, Ph.D., Columbia U. Prof. Emeritus, Molecular Biology and Genetics
 Wilson, David B., Ph.D., Stanford U. Prof., Stephen H. Weiss Presidential Fellow, Biochemistry, Molecular Biology and Genetics
 Wolfner, Mariana F., Ph.D., Stanford U. Prof., Molecular Biology and Genetics
 Zamudio, Kelly R., Ph.D., U. of Washington. Assoc. Prof., Ecology and Evolutionary Biology

Other Teaching Personnel

- Balko, Elizabeth A., Ph.D., College of Environmental Science and Forestry. Sr. Lec., Plant Biology
 Johnson, Bruce R., Ph.D., Boston U. Sr. Lec., Neurobiology and Behavior
 Land, Bruce R., Ph.D., Cornell U., Sr. Lec., Neurobiology and Behavior

Joint Appointees

- Levin, Simon A., Adjunct Prof., Princeton U./ Ecology and Evolutionary Biology
 Likens, Gene E., Adjunct Prof., Cary Institute of Ecosystem Studies/Ecology and Evolutionary Biology

College of Veterinary Medicine

- Alcaraz, Ana, D.V.M., Ph.D., Cornell U. Lec., Biomedical Sciences
 Beyenbach, Klaus W., Ph.D., Washington State U. Prof., Biomedical Sciences
 Bezuidenhout, Abraham, D.V.Sc., U. of Pretoria (South Africa), Sr. Lec., Biomedical Sciences
 Buckles, Elizabeth, D.V.M., Ph.D., U. of Wisconsin. Asst. Prof., Pathology
 Cattafamo, James, M.S., Ph.D., Union Coll. Sr. Res. Assoc., Population Medicine and Diagnostic Services
 Chuang, Huai-hu, Ph.D., U. of California. Asst. Prof., Molecular Physiology
 Cohen, Paula, Ph.D., U. of London (England). Asst. Prof., Genetics
 Farnum, Cornelia E., D.V.M., Ph.D., U. of Wisconsin, Madison. Prof., Biomedical Sciences
 FitzMaurice, Marnie C., V.M.D., Ph.D., U. of Pennsylvania. Instr., Biomedical Sciences
 Fortune, Joanne E., Ph.D., Cornell U. Prof., Biomedical Sciences
 Gilmour, Robert F., Ph.D., SUNY Upstate Medical Center. Prof., Biomedical Sciences
 Glead, Robin, BVSc, MRCVS, U. of Liverpool (England). Assoc. Prof., Clinical Sciences
 Gunn, Teresa M., Ph.D., U. of British Columbia (Canada). Asst. Prof., Biomedical Sciences
 Hermanson, John W., M.S., Ph.D., U. of Florida Gainesville. Assoc. Prof., Biomedical Sciences
 Haupt, Katherine A., V.M.D., Ph.D., U. of Pennsylvania. Prof., Clinical Sciences
 Kotlikoff, Michael I., Ph.D., U. of California, Davis. Prof., Biomedical Sciences
 Lin, David, Ph.D., U. of California, Berkeley. Asst. Prof., Biomedical Sciences
 Loew, Ellis R., Ph.D., U. of California, Los Angeles. Prof., Biomedical Sciences
 Lorr, Nancy, Ph.D., U. of Oregon. Lec., Biomedical Sciences
 Ludders, John, D.V.M., Washington State U. Prof., Clinical Sciences
 Maza, Paul, D.V.M., U. of St. Kitts (West Indies). Lec., Biomedical Sciences
 McDonough, Sean, D.V.M., Ph.D., U. of Pennsylvania. Assoc. Prof., Biomedical Sciences
 Meyers-Wallen, Vicki, V.M.D., Ph.D., U. of Pennsylvania. Assoc. Prof., Biomedical Sciences
 Minor, Ronald, V.M.D., Ph.D., U. of Pennsylvania. Prof., Biomedical Sciences
 Mizer, Linda, D.V.M., Ph.D., Ohio State U. Sr. Lec., Biomedical Sciences
 Nikitin, Alexander Yu, M.D., Ph.D., Petrov Research Inst. of Oncology (Russia). Asst. Prof. of Pathology, Biomedical Sciences
 Njaa, Bradley, L., D.V.M., MVSc, U. of Saskatchewan. Asst. Prof., Biomedical Sciences

- Noden, Drew M., Ph.D., Washington U. (St. Louis). Prof., Biomedical Sciences
 O'Brian, Timothy, Ph.D., U. of Illinois. Prof., Biomedical Sciences
 Oswald, Robert, Ph.D., Vanderbilt U. Prof., Molecular Medicine
 Quaroni, Andrea, Ph.D., U. of Pavia (Italy). Prof., Biomedical Sciences
 Rawson, Richard E., D.V.M., Ph.D., U. of Minnesota. Sr. Lec., Biomedical Sciences
 Roberson, Mark, Ph.D., U. of Nebraska. Prof., Biomedical Sciences
 Schimenti, John, Ph.D., U. of Cincinnati. Prof., Biomedical Sciences
 Schlafer, Donald H., D.V.M., Ph.D., U. of Georgia. Prof., Biomedical Sciences
 Shepard, Laura, D.V.M., Cornell U. Instr., Biomedical Sciences
 Suarez, Susan, Ph.D., U. of Virginia. Prof., Biomedical Sciences
 Summers, Brian, B.V.Sc., Ph.D., Prof., Biomedical Sciences
 Travis, Alexander J., V.M.D., Ph.D., U. of Pennsylvania. Asst. Prof., Biomedical Sciences
 Weiss, Robert S., Ph.D., Baylor Coll. of Medicine. Asst. Prof., Biomedical Sciences
 Wootton, John F., M.S., Ph.D., Cornell U. Prof., Biomedical Sciences
 Xin, Hong-Bo, Ph.D., Beijing Medical U. (People's Republic of China). Asst. Prof., Biomedical Sciences
 Yen, Andrew, Ph.D., Cornell U. Prof., Pathology and Director, Graduate Studies in Environmental Toxicology, Biomedical Sciences

College of Engineering**Joint Appointees**

- Cisne, John L., Assoc. Prof., Geological Sciences/Biological Sciences
 Webb, Watt W., Prof., Applied and Engineering Physics/Biological Sciences

Biological Sciences**Joint Appointees**

- Snedeker, Suzanne M., Asst. Prof., Center for the Environment/Biological Sciences

Division of Nutritional Sciences**Joint Appointees**

- Arion, William J., Prof., Nutritional Sciences/Molecular Biology and Genetics
 Bensadoun, Andre, Prof., Nutritional Sciences/Physiology
 Kazarinoff, Michael N., Assoc. Prof., Nutritional Sciences/Molecular Biology and Genetics
 Wright, Lemuel D., Prof. Emeritus, Nutritional Sciences/Molecular Biology and Genetics

*Joint appointment with College of Arts and Sciences

†Joint appointment with College of Veterinary Medicine

‡Joint appointment with College of Agriculture and Life Sciences

§Joint appointment with College of Engineering

COMPUTING AND INFORMATION SCIENCE

ADMINISTRATION

Robert Constable, dean

Juris Hartmanis, senior associate dean

Jennifer Wofford, assistant dean for educational programs

INTRODUCTION

Computing and Information Science (CIS) offers courses and programs campuswide in various academic disciplines in which computing is integral. It is home to the Department of Computer Science, the Department of Statistical Science, the program in Information Science, and interdisciplinary programs in computational biology, computational science and engineering, game design, and computing in the arts. The faculty members associated with CIS programs hold joint appointments with CIS and another Cornell academic unit.

Computing and Information Science is a rapidly changing area. Please consult the CIS web site, www.cis.cornell.edu, for the most current news of programs and courses, or visit the CIS undergraduate office in 303 Upson Hall.

ACADEMIC PROGRAMS

Computing and Information Science offers the following academic programs through its corresponding colleges. See the departmental listings for details of the programs.

Computational Biology

Undergraduate students interested in computational biology can pursue study in the field through a variety of academic programs within their major. Programs in computational biology are available to students majoring in biology, biological statistics and computational biology (BSCB), and mathematics. Students majoring in computer science should review the vector in computational science.

A concentration in computational biology is available to biological sciences majors in the College of Agriculture and Life Sciences and the College of Arts and Sciences and is coordinated by the Office of Undergraduate Biology. It provides core training in biology and the supporting physical and computer sciences.

The concentration in statistical genomics is offered by the Department of Biological Statistics and Computational Biology to students enrolled in the College of Agriculture and Life Sciences. It provides training in statistics, biology, and computer science. It is designed for students who want to emphasize statistics and bioinformatics.

The concentration in mathematical biology is offered by the Department of Mathematics

and is open to students enrolled in the College of Arts and Sciences. It provides training in mathematics, biology, and computer science. It is designed for students who want to emphasize mathematics.

Computational Science and Engineering

The CIS program in Computational Science and Engineering (CSE) spans several dozen departments and research areas. The field is application-driven and involves a mix of applied mathematics, numerical analysis, and computer science. Numerous courses are taught throughout the university. Go to www.cis.cornell.edu/cse for a list of courses and associated faculty members.

Computer Science

All CIS programs have connections to computer science, the study of computation in all of its forms. The curriculum covers the theory of algorithms and computing and its many applications in science, engineering, and business. Students learn the algorithmic method of thinking and how to bring it to bear on a wide range of problems. They also study the elements of computing and information technology such as system design, problem specification, programming, system analysis and evaluation, and complex modeling. Research areas include artificial intelligence, bioinformatics, computational logic, computer architecture, computer graphics, computer vision, computing systems, databases and digital libraries, natural language processing, networks, programming languages and compilation, scientific computing, security, and theory of algorithms.

The Department of Computer Science offers the computer science major to students in the College of Arts and Sciences and the College of Engineering, the computer science minor to students across colleges, and the Master of Engineering (M.Eng.) degree in computer science.

Computing in the Arts

An undergraduate minor in Computing in the Arts offers students opportunities to use computers to realize works of art, to study the perception of artistic phenomena, and to think about new, computer-influenced paradigms and metaphors for the experiences of making and appreciating art. Faculty from several departments across the university offer courses toward the minor, drawing on disciplines in the arts, computing, the social sciences, the humanities, and the physical sciences. Tracks are available for students pursuing this minor in: computer science, music, psychology, dance, and film. This minor is offered through the College of Arts and Sciences and coordinated by the Department of Computer Science. Students across colleges are eligible to pursue this program of study.

Game Design

The undeniable popularity of games draws the attention of academia, industry, and even the government on areas of design, development, and social impact. The game industry, like the film industry, is an unmistakable force in entertainment. Like filmmaking, game design can thrive and evolve only with the support of a strong academic foundation. The Game Design minor is offered by the Department of Computer Science for students who anticipate that game design will have a prominent role to play in their academic and professional career. Visit www.cs.cornell.edu/degreeprogs/ugrad/CSMinor/GameDesignMinor/index.htm for minor requirements. To learn about the Game Design Initiative at Cornell (GDIAC), visit gdiac.cis.cornell.edu. Students across colleges are eligible to pursue the Game Design minor.

Information Science

The interdisciplinary program Information Science studies the design and use of information systems in a social context. It integrates the study of three aspects of digital information systems. First, information science studies computing systems that provide people with information content; this study overlaps with parts of computer science, stressing the design, construction, and use of large information systems such as the World Wide Web and other global information resources. The second aspect of information science examines how people engage these information resources and how they can be integrated into everyday life. This area is also called "human-centered systems" because it is concerned with systems that hundreds of millions of people will use in daily life. The third aspect deals with understanding how information systems are situated in social, economic, and historical contexts. It explores the economic value of information, the legal constraints on systems, their social impact, and the cultural aspects of their construction. These are synergistic topics, and the next generation of scientists, scholars, business leaders, and government workers will need to understand them and how they relate.

Specific topics emphasized in the information science program include information networks; information discovery; knowledge organization; interaction design; interface design and evaluation; collaboration within and across groups, communities, organizations, and society; computational linguistics; computational techniques in the collection, archiving, and analysis of social science data; information privacy; methods of collecting, preserving, and distributing information; information system design; cognition and learning; social informatics; and cultural studies of computation.

The Information Science (IS) major is offered by the College of Agriculture and Life Sciences and the College of Arts and Sciences. Students in the College of Engineering may major in Information

Science, Systems, and Technology (ISST), which is offered jointly by the Department of Computer Science and the School of Operations Research and Information Engineering. For details about the IS and ISST majors, please refer to the respective colleges.

The minor in information science is available to students in all undergraduate colleges. Go to www.infosci.cornell.edu/ugrad/concentrations.html for details.

Statistical Science

The university-wide Department of Statistical Science coordinates activities in statistics and probability at the undergraduate, graduate, and research levels.

The department comprises four groups: Biological Statistics in the Department of Biological Statistics and Computational Biology, Engineering Statistics in the School of Operations Research and Information Engineering, Mathematical Statistics and Probability in the Department of Mathematics, and Social Statistics in the Department of Social Statistics. The areas covered include, but are not limited to, agricultural statistics, biostatistics, economic and social statistics, epidemiology, manufacturing statistics, quality control and reliability, probability theory, sampling theory, statistical computing, statistical design, statistical theory, and stochastic processes and their applications.

The department offers an undergraduate major and minor in Biometry and Statistics through the Department of Biological Statistics and Computational Biology in the College of Agriculture and Life Sciences. It also offers a minor in Engineering Statistics through the School of Operations Research and Information Engineering in the College of Engineering. Undergraduate majors and minors are under development for other colleges. For information, contact the undergraduate coordinator, 301 Malott Hall, 255-8066.

The department offers a Master of Professional Studies (MPS) in applied statistics for students pursuing careers in business, industry, and government. The MPS program has three main components: a two-semester core course, STSCI 5010 and 5020, covering a wide range of statistical applications, computing, and consulting; an in-depth statistical analysis MPS project supported by the core course; and required course work, including a two-semester course sequence in mathematical probability and statistics, and elective course work selected from offerings in this and other departments at Cornell. The M.P.S. program offers two options: Statistical Analysis and Data-Centered Statistics. A third option, Bioinformatics, is under development.

Students interested in graduate study in statistics and probability can apply to the graduate field of statistics or to one of the other graduate fields of study that offer related course work. Students in the field of statistics plan their graduate programs with the assistance of their special committee. For detailed information on opportunities for graduate study, contact the director of graduate studies, 301 Malott Hall.

A statistical consulting service is offered by the faculty of DSS and the Cornell Statistical Consulting Unit (CSCU), www.cscu.cornell.edu.

THE INFORMATION SCIENCE MINOR

A minor in information science is available to students in the Colleges of Agriculture and Life Sciences; Architecture, Art, and Planning (available to Architecture and Planning students only); Arts and Sciences; Engineering; Human Ecology; and the Schools of Hotel Administration and Industrial and Labor Relations. Because of small differences in regulations between the colleges, the requirements may vary slightly, depending on a student's college and, in a few cases, a student's major. Students interested in pursuing the information science minor must initiate the process by sending an e-mail message with their name, college, year of study (e.g., second-semester sophomore), expected graduation date, and (intended) major to minor@infosci.cornell.edu. See www.infosci.cornell.edu/ugrad.html for the most up-to-date description of the minor and its requirements.

Information science is an interdisciplinary field covering all aspects of digital information. The program has three main areas: human-centered systems, social systems, and information systems. Human-centered systems studies the relationship between humans and information, drawing from human-computer interaction and cognitive science. Social systems examines information in its economic, legal, political, cultural, and social contexts. Information systems studies the computer science problems of representing, storing, manipulating, and using digital information.

The minor has been designed to ensure that students have substantial grounding in all three of these areas, as well as in statistics. To this end, the requirements for the undergraduate minor are as follows: All courses must be chosen from the course lists below. In addition, a letter grade of at least C is required; S-U courses are not allowed.

Note: Course credits from institutions other than Cornell may not be counted toward the IS minor. Engineering students must use ENGRD 2700 or CEE 3040. Hotel students must use HADM 2201.

- **Statistics:** one course.
- **Human-centered systems** (human-computer interaction and cognitive science): two courses (for all colleges except Engineering and Hotel); one course (Engineering and Hotel).
- **Social systems** (social, economic, political, cultural, and legal issues): one course.
- **Information systems** (primarily computer science): two courses for all colleges except Hotel. Hotel students need to take one course in this area. Engineering students may not use INFO 1300. CS 2110 may not be used by students who are required to take it for their major.
- **Elective:** one additional course from any component area. Hotel students must take three courses in this category, from the following: HADM 3374, HADM 4474, or AEM 3220. (Engineering students and all computer science majors must select a course from human-centered systems or social systems. Communication majors must select a course outside Communication. Students in other majors

should check with their advisors to make sure there are no special departmental restrictions or requirements.)

Statistics

An introductory course that provides a working knowledge of basic probability and statistics and their application to analyzing data occurring in the real world.

Engineering students must take one of the following:

- ENGRD 2700 Basic Engineering Probability and Statistics
- CEE 3040 Uncertainty Analysis in Engineering

Hotel students must take:

- HADM 2201 Hospitality Quantitative Analysis

All other students can meet this requirement with any one of the following:

- MATH 1710 Statistical Theory and Application in the Real World
- STSCI 2010 Introductory Statistics
- AEM 2100 Introductory Statistics
- PAM 2100 Introduction to Statistics
- HADM 2201 Hospitality Quantitative Analysis
- ENGRD 2700 Basic Engineering Probability and Statistics
- BTRY 3010 Statistical Methods I
- SOC 3010 Evaluating Statistical Evidence
- CEE 3040 Uncertainty Analysis in Engineering
- ILRST 3120 Applied Regression Methods
- ECON 3190 Introduction to Statistics and Probability
- PSYCH 3500 Statistics and Research Design

Human-Centered Systems

- COGST 1101 Introduction to Cognitive Science
- PSYCH 2050 Perception
- INFO 2140 Cognitive Psychology
- INFO 2450 Communication and Technology
- PSYCH 2800 Introduction to Social Psychology
- PSYCH 3420 Human Perception: Applications to Computer Graphics, Art, and Visual Display
- INFO 3400 Psychology of Social Computing
- INFO 3450 Human-Computer Interaction Design
- PSYCH 3470 Psychology of Visual Communications
- INFO 3650 Technology and Collaboration
- PSYCH 3800 Social Cognition
- PSYCH 4160 Modeling Perception and Cognition
- INFO 4400 Advanced Human-Computer Interaction Design
- INFO 4450 Seminar in Computer-Mediated Communication

- INFO 4500 Language and Technology
- DEA 4700 Applied Ergonomic Methods

Social Systems

- INFO 2040 Networks
- STS 2501 Technology in Society
- INFO 2921 Inventing an Information Society
- ECON 3010 Microeconomics*
- SOC 3040 Social Networks and Social Processes
- ECON 3130 Intermediate Microeconomic Theory*
- INFO 3200 New Media and Society*
- AEM 3220 Internet Strategy
- INFO 3490 Media Technologies
- INFO 3551 Computers: From the 17th Century to the Dotcom Boom
- INFO 3561 Computing Cultures
- INFO 3660 History and Theory of Digital Art
- ECON 3680 Game Theory*
- INFO 3871 The Automatic Lifestyle: Consumer Culture and Technology
- STS 4111 Knowledge, Technology, and Property
- INFO 4144 Responsive Environments
- SOC 4150 Internet and Society*
- ECON 4190 Economic Decisions Under Uncertainty
- COMM 4280 Communication Law
- INFO 4290 Copyright in the Digital Age
- ORIE 4350 Introduction to Game Theory*
- INFO 4470 Social and Economic Data
- HADM 4489 The Law of the Internet and E-Commerce
- ECON 4760 Decision Theory I
- ECON 4770 Decision Theory II
- INFO 4850 Computational Methods for Complex Networks
- INFO 5150 Culture, Law, and Politics of the Internet

*Only one of ECON 3010 and 3130 can be taken for IS credit. Only one of ORIE 4350 and ECON 3680 can be taken for IS credit. Only one of INFO 3220 and SOC 4150 may be taken for IS credit.

Information Systems

- INFO 1300 Introductory Design and Programming for the Web

Note: INFO 1301 and 1302 (no longer offered) may count together in place of INFO 1300.

- CS 2110 Object-Oriented Programming and Data Structures*
- INFO 2300 Intermediate Design and Programming for the Web*
- CIS 3000 Introduction to Computer Game Design
- INFO 3300 Data-Driven Web Applications
- INFO 4300 Information Retrieval
- INFO 4302 Web Information Systems

- CS 4320 Introduction to Database Systems
- LING 4424 Computational Linguistics
- LING 4474 Introduction to Natural Language Processing
- CS 4620 Introduction to Computer Graphics
- CS 4700 Foundations of Artificial Intelligence
- ORIE 4740 Statistical Data Mining I
- CS 4780 Machine Learning
- ORIE 4800 Information Technology
- ORIE 4810 Delivering OR Solutions with Information Technology
- ORIE 4850 Application of Operations Research and Game Theory to Information Technology
- CS 5150 Software Engineering
- INFO 5300 Architecture of Large-Scale Information Systems
- CS 5430 System Security
- ECE 5620 Fundamental Information Theory
- CS 5780 Empirical Methods in Machine Learning and Data Mining

*The following exceptions apply:

- INFO 1300: Engineering students and Computer Science majors may not use this course for the minor.
- INFO 2300: Computer Science majors may not use this course for the minor.
- CS 2110: Students for whom this is a required major course may not use it for the minor, e.g., Computer Science or Operations Research and Information Engineering majors.

COMPUTING AND INFORMATION SCIENCE (CIS) COURSES

CIS 1121 Introduction to MATLAB (also EAS 1121)

Fall, spring, 2 credits. Corequisite: MATH 1110, 1910, or equivalent. No programming experience assumed.

Introduction to elementary computer programming concepts using MATLAB. Topics include problem analysis, development of algorithms, selection, iteration, functions, and arrays. Examples and assignments are chosen to build an appreciation for computational science. The goal is for each student to develop a facility with MATLAB that will be useful in other courses whenever there is a need for computer problem solving or visualization.

CIS 1610 Computing in the Arts (also CS/ENGR 1610, DANCE 1540, FILM 1750, MUSIC 1465, PSYCH 1650)

Fall, 3 credits.

For description, see CS 1610.

CIS 1620 Visual Imaging in the Electronic Age (also ARCH 3702, ART 1700, CS/ENGR 1620)

Fall, 3 credits.

For description, see ART 1700.

CIS 3000 Introduction to Computer Game Design

Spring, 4 credits. Prerequisites: students must satisfy at least one of the following, according to their area of interest (art, music, or programming): Art: ART 2501 or equivalent; Music: CS 111x or INFO 1301–1302, MUSIC 1421 or equivalent; Programming: CS/ENGR 2110 or equivalent.

Investigates the theory and practice of developing computer games from a blend of technical, aesthetic, and cultural perspectives. Technical aspects of game architecture include software engineering, artificial intelligence, game physics, computer graphics, and networking. Aesthetic and cultural aspects of design include art and modeling, sound and music, history of games, genre analysis, role of violence, gender issues in games, game balance, and careers in the industry. Programmers, artists, and musicians collaborate to produce an original computer game.

CIS 4002 Advanced Projects in Game Design

Fall, 3 credits. Prerequisites: CIS 3000 or permission of instructor.

Project-based follow-up course to CIS 3000. Students work in a multidisciplinary team to develop an original computer game or an application that explores innovative game technology. Students have the goal of submitting their work to a contest or conference. Grading is based on completion of project plans and documentation, teamwork, presentations and demonstrations, class participation, and quality of final projects. Instructional meetings are arranged based on student and instructor schedules.

CIS 4205 Effective Use of High-Performance Computing

Spring, usually weeks 1–7. 2 credits. Prerequisites: proficiency in C, C++, Fortran, or Fortran 90.

A hands-on introduction to high-performance computing (HPC) for graduate students or advanced undergraduate students who will use HPC as a tool in their work. Various HPC architectural platforms are described with a focus on computational clusters. Students learn how to identify and exploit parallelism in algorithms and legacy applications; how to measure parallel speedup and efficiency; and how to diagnose bottlenecks affecting performance. Parallel programming with MPI, OpenMP, and task-farming techniques (for web services and grid computing) is covered in depth. Examples and assignments are taken from typical application areas such as matrix and Monte Carlo computations. The goal of the class is for students to gain practical HPC experience for use in their specific fields of research.

CIS 4206 Introduction to Scripting in Python and Perl

Spring, usually weeks 1–8. 2 credits. Prerequisites: basic computer programming skills or permission of instructor.

Scientific computing today requires heterogeneous systems, software, and data to be used together in many different ways, based on desired results. Researchers commonly develop work-flows that control the processing of data and/or experiments from beginning to the desired results. The “glue” that often links the various stages of these work-flows is scripting languages. In

this course we explore scripting with two of the most popular scripting languages, Perl and Python, from the basics to specific types of functions/capabilities that are useful in the development and maintenance of scientific work-flows. Examples are provided for Microsoft Windows, Mac OS X and Red Hat Linux. Best-of-breed modules and tools are covered for each platform based on student interest.

CIS 4999 Independent Reading and Research

Fall, spring. 1-4 credits.
Independent reading and research for undergraduates.

CIS 5040 Applied Systems Engineering (also CEE 5040, SYSEN 5100, ECE/ ORIE 5120, MAE 5910)

Fall. 3 credits. Prerequisites: senior or graduate standing in engineering field; concurrent or recent (past two years) enrollment in group-based project with strong system design component approved by course instructor.
For description, see SYSEN 5100.

CIS 5050 Systems Analysis Architecture, Behavior, and Optimization (also CEE 5050, ECE/ ORIE 5130, MAE 5920, SYSEN 5200)

Spring. 3 credits. Prerequisite: Applied Systems Engineering (CEE 5240, ECE 5120, MAE 5910, ORIE 5120, or SYSEN 5100).
For description, see SYSEN 5200.

CIS 6229 Computational Methods for Nonlinear Systems (also PHYS 7682)

Fall. 4 credits. Enrollment may be limited.
For description, see PHYS 7682.

CIS 7999 Independent Research

Fall, spring. Variable credit. Prerequisite: permission of CIS faculty member.
Independent research or master of engineering project.

COMPUTER SCIENCE

The Department of Computer Science is affiliated with both the College of Arts and Sciences and the College of Engineering. Students in either college may major in computer science. The department is also part of CIS. Its courses are an integral part of CIS's several educational programs.

Consult the following web site for updates made after the publication of *Courses of Study*: www.cs.cornell.edu/courses/listofscourses/index.htm.

CIS 1109 Fundamental Programming Concepts

Summer. 2 credits. Prerequisite: pre-freshman standing or permission of instructor. Credit may not be applied toward engineering degree. S-U grades only.
Designed for students who intend to take CS 111x but are not adequately prepared for it. Basic programming concepts and problem analysis are studied. An appropriate high-level programming language is used. Students with previous programming experience and students who do not intend to take CS 111x should not take this course.

CS 1110 Introduction to Computing Using Java

Fall, spring, summer. 4 credits. Assumes basic high school mathematics (no calculus) but no programming experience. Programming and problem solving using Java. Emphasizes principles of software development, style, and testing. Topics include object-oriented concepts, procedures and functions, iteration, arrays, strings, algorithms, exceptions, GUIs (graphical user interfaces). Weekly labs provide guided practice on the computer, with staff present to help. Assignments use graphics and GUIs to help develop fluency and understanding.

CS 1112 Introduction to Computing Using MATLAB

Fall, spring. 4 credits. Corequisite: MATH 1110, 1910, or equivalent. Assumes student is comfortable with mathematics (at level of one semester of calculus) but has no prior programming experience. Programming and problem solving using MATLAB. Emphasizes the systematic development of algorithms and programs. Topics include iteration, functions, arrays, and MATLAB graphics. Assignments are designed to build an appreciation for complexity, dimension, fuzzy data, inexact arithmetic, randomness, simulation, and the role of approximation.

CS 1114 Introduction to Computing Using MATLAB and Robotics

Spring. 4 credits. Prerequisite: some programming experience.
Honors-level introduction to computer science using camera-controlled robots using MATLAB. Emphasis is on modular design of programs and on fundamental algorithms. Extensive laboratory experiments with cameras and robots, including Sony Aibo. Example projects include controlling a robot by pointing a light stick and making a robot recognize simple colored objects.

CS 1130 Transition to Object-Oriented Programming

Fall, spring. 1 credit. Prerequisite: one course in programming. S-U grades only.
Introduction to object-oriented concepts using Java. Assumes programming knowledge in a language like MATLAB, C, C++, or Fortran. Students who have learned Java but were not exposed heavily to OO are welcome.

CS 1132 Transition to MATLAB

Fall, spring. 1 credit. Prerequisite: one course in programming. S-U grades only.
Introduction to MATLAB and scientific computing. Covers the MATLAB environment, assignment, conditionals, iteration, scripts, functions, arrays, scientific graphics, and vectorized computation. Assumes programming knowledge in a language like Java, C, C++, or Fortran.

CS 1300 Introductory Design and Programming for the Web (also INFO 1300)

Fall. 4 credits.
For description, see INFO 1300.

CS 1610 Computing in the Arts (also CIS/ENGRI 1610, DANCE 1540, FILM 1750, MUSIC 1465, PSYCH 1650)

Fall. 3 credits. Recommended: good comfort level with computers and some of the arts.
Over the centuries, artists in a wide variety of media have employed many approaches to the creative process, ranging from the

philosophical to the mechanical to the virtual. This course unravels some of the mysteries going on inside software used for art and music. It looks at ways of breaking things apart and sampling and ways of putting things together and resynthesizing, and explores ideas for creation. This course does not teach software packages for creating art and music. The course complements ART 1701+ and MUSIC 1421+.

CS 1620 Visual Imaging in the Electronic Age (also ARCH 3702, ART 1700, CIS/ENGRI 1620)

Fall. 3 credits.
For description, see ART 1700.

CS 1710 Introduction to Cognitive Science (also COGST 1101, LING 1170, PHIL 1910, PSYCH 1102)

Fall, summer. 3 credits.
For description, see COGST 1101.

CS 2022 Introduction to C

Fall, spring, usually weeks 1-4. 1 credit.
Prerequisite: one programming course or equivalent programming experience.
Credit granted for both CS 2022 and 2024 only if 2022 taken first. S-U grades only.
Brief introduction to the C programming language and standard libraries. Unix accounts are made available for students wishing to use that system for projects, but familiarity with Unix is not required. Projects may be done using any modern implementation of C. CS 2024 (C++ Programming) includes much of the material covered in 2022. Students planning to take CS 2024 normally do not need to take 2022.

CS 2024 C++ Programming

Fall. 2 credits. Prerequisite: one programming course or equivalent programming experience. Students who plan to take CS 2022 and 2024 must take 2022 first. S-U grades only.

An intermediate introduction to the C++ programming language and the C/C++ standard libraries. Topics include basic statements, declarations, and types; stream I/O; user-defined classes and types; derived classes, inheritance, and object-oriented programming; exceptions and templates. Recommended for students who plan to take advanced courses in computer science that require familiarity with C++ or C. Students planning to take CS 2024 normally do not need to take CS 2022; 2024 includes most of the material taught in 2022.

CS 2026 Introduction to C#

Spring, usually weeks 5-8. 1 credit.
Prerequisite: CS/ENGRD 2110 or equivalent experience. S-U grades only.
Introduces students to building applications in the .NET environment using the C# language.

CS 2042 Unix Tools

Fall, usually weeks 5-8. 1 credit.
Prerequisite: one programming course or equivalent programming experience. S-U grades only.
Introduction to Unix, emphasizing tools for file management, communication, process control, managing the Unix environment, and rudimentary shell scripts. Projects assume no previous knowledge of Unix or expertise in any particular language.

CS 2044 Advanced UNIX Programming and Tools

Spring, usually weeks 5–8. 1 credit.
Prerequisite: CS 2042 or equivalent. S–U grades only.

Focuses on Unix as a programming environment for people with a basic knowledge of Unix and experience programming in at least one language. Projects cover advanced shell scripts (sh, ksh, csh), Makefiles, programming and debugging tools for C and other languages, and more modern scripting languages such as Perl and Python. Students with little or no experience with Unix should take CS 2042 first.

CS 2110 Object-Oriented Programming and Data Structures (also ENGRD 2110)

Fall, spring, summer. 3 credits.
Prerequisite: CS 1110, CS 1130, or CS 1113 or (CS 1112 if completed before fall 2007) or equivalent course in Java or C++.

Intermediate programming in a high-level language and introduction to computer science. Topics include program structure and organization, object-oriented programming (classes, objects, types, sub-typing), graphical user interfaces, algorithm analysis (asymptotic complexity, big “O” notation), recursion, data structures (lists, trees, stacks, queues, heaps, search trees, hash tables, graphs), simple graph algorithms. Java is the principal programming language.

CS 2300 Intermediate Design and Programming for the Web (also INFO 2300)

Spring. 3 credits. Prerequisite: CS 1300 strongly recommended. Must be taken before CS 3300.

For description, see INFO 2300.

CS 2800 Discrete Structures

Fall, spring. 3 credits. Pre- or corequisite: one programming course or permission of instructor.

Covers the mathematics that underlies most of computer science. Topics include mathematical induction; logical proof; propositional and predicate calculus; combinatorics and discrete mathematics; basic probability theory; basic number theory; sets, functions, and relations; partially ordered sets; and graphs. These topics are discussed in the context of applications to many areas of computer science, including game playing, the RSA cryptosystem, data mining, load balancing in distributed systems, properties of the Internet and World Wide Web, and web searching.

CS 2850 Networks (also ECON/INFO 2040, SOC 2090)

Spring. 4 credits. Prerequisites: none.
For description, see ECON 2040.

CS 3110 Data Structures and Functional Programming

Fall, spring. 4 credits. Prerequisite: CS 2110 and 2111 or equivalent programming experience. Pre- or corequisite: CS 2800. Should not be taken concurrently with CS 3410 or 3420.

Advanced programming course that emphasizes functional programming techniques and data structures. Programming topics include recursive and higher-order procedures, models of programming language evaluation and compilation, type systems, and polymorphism. Data structures and algorithms covered include graph algorithms,

balanced trees, memory heaps, and garbage collection. Also covers techniques for analyzing program performance and correctness.

CS 3220 Introduction to Scientific Computation (also ENGRD 3220)

Spring, summer. 3 credits. Prerequisites: CS 1112 or 1132 and MATH 2220, 2230, or 2940.

Introduction to elementary numerical analysis and scientific computation. Topics include interpolation, quadrature, linear and nonlinear equation solving, least-squares fitting, and ordinary differential equations. The MATLAB computing environment is used. Vectorization, efficiency, reliability, and stability are stressed. Includes special lectures on computational statistics.

CS 3300 Data-Driven Web Applications (also INFO 3300)

Spring. 3 credits. Prerequisite: CS/ENGRD 2110 and (CS 2300 or permission of instructor). CS majors may use only one of the following toward their degree: CS/INFO 3300 or CS 4321.

For description, see INFO 3300.

CS 3410 Systems Programming

Spring. 4 credits. Prerequisite: CS 2110 or equivalent programming experience. Should not be taken concurrently with CS 3110.

Introduction to systems programming, computer organization, and the hardware/software interface. Topics include representation of information, machine and assembly languages, processor organization, memory management, input/output mechanisms, and basic network programming. Also covered are techniques for analyzing program performance and optimization.

CS 3420 Computer Organization (also ECE 3140)

Spring. 4 credits. Prerequisite: CS 2110 or ENGRD 2300. Should not be taken concurrently with CS 3110.

For description, see ECE 3140.

CS 3740 Computational Linguistics (also COGST 4240, LING 4424)

Fall. 4 credits. Recommended: CS 2042.

For description, see LING 4424.

CS 3810 Introduction to Theory of Computing

Fall, summer. 3 credits. Prerequisite: CS 2800 or permission of instructor.

Introduction to the modern theory of computing: automata theory, formal languages, and effective computability.

CS 4120 Introduction to Compilers

Fall. 3 credits. Prerequisites: CS 3110 or permission of instructor and CS 3410 or 3420. Corequisite: CS 4121.

Introduction to the specification and implementation of modern compilers. Topics include lexical scanning, parsing, type checking, code generation and translation, an introduction to optimization, and the implementation of modern programming languages.

CS 4121 Practicum in Compilers

Fall. 2 credits. Corequisite: CS 4120.

Compiler implementation project related to CS 4120.

CS 4210 Numerical Analysis and Differential Equations (also MATH 4250)

Fall. 4 credits. Prerequisites: MATH 2210 or 2940 or equivalent, one additional mathematics course numbered 3000 or above, and knowledge of programming. For description, see MATH 4250.

CS 4220 Numerical Analysis: Linear and Nonlinear Problems (also MATH 4260)

Spring. 4 credits. Prerequisites: MATH 2210 or 2940 or equivalent, one additional mathematics course numbered 3000 or above, and knowledge of programming. Introduction to the fundamentals of numerical linear algebra: direct and iterative methods for linear systems, eigenvalue problems, singular value decomposition. In the second half of the course, the above are used to build iterative methods for nonlinear systems and for multivariate optimization. Strong emphasis is placed on understanding the advantages, disadvantages, and limits of applicability for all the covered techniques. Computer programming is required to test the theoretical concepts throughout the course.

CS 4300 Information Retrieval (also INFO 4300)

Fall. 3 credits. Prerequisite: CS 2110 or equivalent.

For description, see INFO 4300.

CS 4302 Web Information Systems (also INFO 4302)

Spring. 3 credits. Prerequisites: CS 2110 and some familiarity with web site technology.

For description, see INFO 4302.

CS 4320 Introduction to Database Systems

Fall. 3 credits. Prerequisites: CS 3110 (or CS 2110, 2111, and permission of instructor).

Introduction to modern database systems. Concepts covered include storage structures, access methods, query languages, query processing and optimization, transaction management, recovery, database design, XML, and XQuery. The course focuses on the design and internals of modern database systems.

CS 4321 Practicum in Database Systems

Fall. 2 credits. Pre- or corequisite: CS 4320. CS majors may use only one of the following toward their degree: CS/INFO 3300 or CS 4321.

Students build part of a real database system in C++.

CS 4410 Operating Systems

Fall. 3 credits. Prerequisite: CS 3410 or 3420.

Introduction to the logical design of systems programs, with emphasis on multiprogrammed operating systems. Topics include process synchronization, deadlock, memory management, input-output methods, information sharing, protection and security, and file systems. The impact of network and distributed computing environments on operating systems is also discussed.

CS 4411 Practicum in Operating Systems

Fall. 2 credits. Corequisite: CS 4410. Studies the practical aspects of operating systems through the design and implementation of an operating system kernel that supports multiprogramming, virtual memory, and various input-output devices. All the programming for the project is in a high-level language.

CS 4420 Computer Architecture (also ECE 4750)

Fall. 4 credits. Prerequisites: ENGRD 2300 and CS 3420/ECE 3140. For description, see ECE 4750.

CS 4620 Introduction to Computer Graphics (also ARCH 3704)

Fall. 3 credits. Prerequisite: CS/ENGRD 2110. Introduction to the principles of computer graphics in two and three dimensions. Topics include digital images, filtering and anti-aliasing, 2-D and 3-D affine geometry, ray tracing, perspective and 3-D viewing, the graphics pipeline, curves and surfaces, and human visual perception. Homework assignments require some Java programming. May be taken with or without concurrent enrollment in CS 4621.

CS 4621 Computer Graphics Practicum

Fall. 2 credits. Pre- or corequisite: CS 4620. Provides CS 4620 students with hands-on experience in computer graphics programming on modern graphics hardware. A semester-long project involves building a substantial interactive 3D system. The course uses Java and OpenGL for code development.

CS 4700 Foundations of Artificial Intelligence

Fall. 3 credits. Prerequisites: CS/ENGRD 2110 and CS 2800 (or equivalent). Challenging introduction to the major subareas and current research directions in artificial intelligence. Topics include knowledge representation, heuristic search, problem solving, natural-language processing, game-playing, logic and deduction, planning, and machine learning.

CS 4701 Practicum in Artificial Intelligence

Fall. 2 credits. Pre- or corequisite: CS 4700. Project portion of CS 4700. Topics include knowledge representation systems, search procedures, game-playing, automated reasoning, concept learning, reinforcement learning, neural nets, genetics algorithms, planning, and truth maintenance.

CS 4740 Introduction to Natural Language Processing (also COGST 4740, LING 4474)

Spring. 4 credits. Prerequisite: CS 2110. Computationally oriented introduction to natural language processing, the goal of which is to enable computers to use human languages as input, output, or both. Possible topics include parsing, grammar induction, information retrieval, and machine translation.

CS 4780 Machine Learning

Spring. 4 credits. Prerequisites: CS 2100, CS 2800, or basic probability theory and basic knowledge of linear algebra. Machine learning is concerned with the question of how to make computers learn from experience. The ability to learn is not only central to most aspects of intelligent behavior, but machine learning techniques

have become key components of many software systems. For example, machine learning techniques are used to create spam filters, to analyze customer purchase data, and to explore new domains of science. This course introduces the fundamental set of techniques and algorithms that constitute machine learning as of today, including classification methods like decision trees and support vector machines, parametric Bayesian learning and hidden Markov models, as well as unsupervised learning and reinforcement learning. The course discusses algorithms and methods and provides an introduction to the theory of machine learning.

[CS 4782 Probabilistic Graphical Models (also BTRY 4790)]

Fall. 4 credits. Prerequisites: probability theory (BTRY 4080 or equivalent), programming and data structures (CS 2110 or equivalent); course in statistical methods recommended but not required (BTRY 4090 or equivalent). Next offered 2010-2011.

For description, see BTRY 4790.]

CS 4812 Quantum Computation (also PHYS 4481/7681)

Spring. 2 credits. Prerequisite: familiarity with theory of vector spaces over complex numbers.

For description, see PHYS 4481.

CS 4820 Introduction to Analysis of Algorithms

Spring, summer. 4 credits. Prerequisites: CS 2800 and 3110. Develops techniques used in the design and analysis of algorithms, with an emphasis on problems arising in computing applications. Example applications are drawn from systems and networks, artificial intelligence, computer vision, data mining, and computational biology. This course covers four major algorithm design techniques (greedy algorithms, divide-and-conquer, dynamic programming, and network flow), computability theory focusing on undecidability, computational complexity focusing on NP-completeness, and algorithmic techniques for intractable problems (including identification of structured special cases, approximation algorithms, and local search heuristics).

[CS 4830 Introduction to Cryptography

Fall. 4 credits. Prerequisites: CS 2800 (or equivalent), mathematical maturity, or permission of instructor. Next offered 2010-2011. Introductory course in cryptography. Topics include one-way functions, encryption, digital signatures, pseudo-random number generation, zero-knowledge and basic protocols. Emphasizes fundamental notions and constructions with proofs or security based on precise definitions and assumptions.]

CS 4850 Mathematical Foundations for the Information Age

Spring. 4 credits. Prerequisite: mathematical maturity. Covers the mathematical foundation underlying modeling and searching of the web and other complex networks, discovering trends, data mining, and making recommendations based on user behavior. Topics include random graphs; tail bounds; branching processes; spectral analysis; clustering; learning mixtures of distributions; extracting information from large, high dimensional, and noisy data; VC

dimension; latent semantic indexing; and collaborative filtering.

CS 4860 Applied Logic (also MATH 4860)

Fall. 4 credits. Prerequisites: MATH 2220 or 2940, CS 2800 or equivalent (e.g., MATH 3320, 4320, 4340, 4810), and some additional course in mathematics or theoretical computer science. Propositional and predicate logic, compactness and completeness by tableaux, natural deduction, and resolution. Equational logic. Herbrand Universes and unification. Rewrite rules and equational logic, Knuth-Bendix method, and the congruence-closure algorithm and lambda-calculus reduction strategies. Topics in Prolog, LISP, ML, or Nuprl. Applications to expert systems and program verification.

CS 4999 Independent Reading and Research

Fall, spring. 1-4 credits. Independent reading and research for undergraduates.

CS 5150 Software Engineering

Fall. 4 credits. Prerequisite: CS 2110 or equivalent experience programming in Java or C++. Introduction to the practical problems of specifying, designing, and building large, reliable software systems. Students work in teams on projects for real clients. This work includes a feasibility study, requirements analysis, object-oriented design, implementation, testing, and delivery to the client. Additional topics covered in lectures include professionalism, project management, and the legal framework for software development.

CS 5220 Applications of Parallel Computers

Spring. 4 credits. Prerequisites: course in numerical methods at level of CS 3220 or higher. Models for parallel programming and survey of parallel machines. Existing parallel programming languages, vectorizing compilers, and parallel libraries and toolboxes. Techniques for data partitioning, synchronization, and load balancing. Performance tuning for serial and parallel codes. Applications to scientific problems. Work includes detailed study and programming of medium-sized representative applications.

CS 5300 The Architecture of Large-Scale Information Systems (also INFO 5300)

Spring. 4 credits. Prerequisite: CS/INFO 3300 or CS 4320. For description, see INFO 5300.

CS 5410 Intermediate Computer Systems

Fall or spring. 4 credits. Prerequisite: CS 4410 or permission of instructor. Next offered fall 2009. Focuses on practical issues in designing and implementing distributed software. Topics vary depending on instructor. Recent offerings have covered object-oriented software development methodologies and tools, distributed computing, fault-tolerant systems, and network operating systems or databases. Students undertake a substantial software project. Many students obtain additional project credit by co-registering in CS 4999 or 7999.

CS 5420 Parallel Computer Architecture (also ECE 5720)

Fall. 4 credits. Prerequisite: ECE 4750.
For description, see ECE 5720.

CS 5430 System Security

Fall or spring. 4 credits. Prerequisites: CS 4410 or 4450 and familiarity with JAVA, C, or C# programming languages. Next offered spring 2010.

Discusses security and survivability for computers and communications networks. Includes discussions of policy issues (e.g., the national debates on cryptography policy) as well as discussions of the technical alternatives for implementing the properties that comprise "trustworthiness" in a computing system. Covers mechanisms for authorization and authentication as well as cryptographic protocols.

CS 5620 Interactive Computer Graphics

Fall. 4 credits. Prerequisite: CS 4620.0. Methods for interactive computer graphics, targeting applications including games, visualization, design, and immersive environments. Topics include programming graphics processing units (GPUs), shading models, advanced texturing, shadow algorithms, advanced lighting, hierarchical acceleration structures, and animation.

CS 5643 Physically Based Animation for Computer Graphics

Spring. 4 credits. Prerequisites: CS/ENGRD 3220 and/or CS 4620 or permission of instructor.

Modern computer animation and interactive digital entertainment are making increasingly sophisticated use of tools from scientific and engineering computing. This course introduces students to common physically based modeling techniques for animation of virtual characters, fluids and gases, rigid and deformable solids, and other systems. Aspects of interactive simulation and multi-sensory feedback are also discussed. A hands-on programming approach is taken, with an emphasis on small interactive computer programs.

CS 5722 Heuristic Methods for Optimization (also CEE 5290, ORIE 5340)

Fall. 3 or 4 credits. Prerequisites: CS/ENGRD 2110 or 3220 or CEE/ENGRD 3200, or graduate standing, or permission of instructor.

For description, see CEE 5290.

CS 6110 Advanced Programming Languages

Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. Study of programming paradigms: functional, imperative, concurrent, and logic programming. Models of programming languages, including the lambda calculus. Type systems, polymorphism, modules, and other object-oriented constructs. Program transformations, programming logic, and applications to programming methodology.

CS 6210 Matrix Computations

Fall. 4 credits. Prerequisites: MATH 4110 and 4310 or permission of instructor. Offered alternate years.

Stable and efficient algorithms for linear equations, least squares, and eigenvalue problems. Direct and iterative methods are considered. The MATLAB system is used extensively.

[CS 6240 Numerical Solution of Differential Equations

Spring. 4 credits. Prerequisites: exposure to numerical analysis (e.g., CS 4210 or 6210) and differential equations, and knowledge of MATLAB.]

CS 6320 Database Management Systems

Spring. 4 credits. Prerequisite: CS 4320 or permission of instructor. Covers a variety of advanced issues ranging from transaction management to query processing to data mining. Involves extensive paper reading and discussion. Development of a term project with research content is required.

CS 6322 Advanced Database Systems

Fall. 4 credits. Covers advanced topics in database systems and data mining. The exact set of topics changes with each offering of the course.

CS 6410 Advanced Systems

Fall or spring. 4 credits. Prerequisite: CS 4410 or permission of instructor. Offered fall 2009.

Advanced course in systems, emphasizing contemporary research in distributed systems. Topics may include communication protocols, consistency in distributed systems, fault-tolerance, knowledge and knowledge-based protocols, performance, scheduling, concurrency control, and authentication and security issues.

CS 6460 Peer-to-Peer Systems

Spring. 4 credits. Recommended: CS 6410. Peer-to-peer (P2P) systems, in which clients not only consume resources but also provide their own resources for the use of other clients, have emerged as a new architectural paradigm in distributed computing. This course examines peer-to-peer systems and discusses existing and new applications. Students are expected to perform extensive reading on P2P and build a peer-to-peer system as part of this course.

CS 6464 Advanced Distributed Storage Systems

Spring. 4 credits. Prerequisite: CS 4410 or permission of instructor. Broadly examines distributed storage systems in their many manifestations. Explores how to harness and maintain the collective storage capabilities in storage systems from global-scale enterprises and cloud computing to peer-to-peer, ad hoc, and home networks. Teaches abstractions, design, and implementation techniques that allow the building of the kind of scalable high-performance distributed systems that can deal with real-world workload. Students read recent research papers on server design, network programming, naming, various storage systems, security, and fault tolerance.

[CS 6620 Advanced Interactive Graphics

Fall or spring. 4 credits. Prerequisites: CS 4620 and 4621 or 5620 or permission of instructor. Next offered 2010–2011. State-of-the-art techniques for high-quality rendering techniques used in simulation, games, and movies. Focus is on practical rendering algorithms for graphics applications.]

CS 6630 Realistic Image Synthesis

Fall or spring. 4 credits. Prerequisites: CS 4620 or equivalent and undergraduate-level understanding of algorithms, probability and statistics, vector calculus, and programming. Offered fall 2009. Advanced course in realistic image synthesis, focusing on the computation of physically accurate images. Topics include radiometry; Monte Carlo methods, models for light reflection from surfaces and scattering in volumes, and algorithms for global illuminations.

[CS 6650 Computational Motion

Fall. 4 credits. Prerequisites: undergraduate-level understanding of algorithms, and some scientific computing. Offered alternate years; next offered 2010–2011.

Covers computational aspects of motion, broadly construed. Topics include the computer representation, modeling, analysis, and simulation of motion. Students implement several of the algorithms covered in the course and complete a final project.]

CS 6670 Computer Vision

Fall or spring. 4 credits. Prerequisites: undergraduate-level understanding of algorithms and MATH 2210 or equivalent. Offered fall 2009. Introduction to computer vision, with an emphasis on discrete optimization algorithms and on applications in medical imaging. Topics include edge detection, image segmentation, stereopsis, motion and optical flow, active contours, and the Hausdorff distance. Students are required to implement several of the algorithms covered in the course and complete a final project.

CS 6700 Advanced Artificial Intelligence

Spring. 4 credits. Prerequisites: CS 4700 or permission of instructor. Artificial intelligence (AI) provides many computational challenges. This course covers a variety of areas in AI, including knowledge representation, automated reasoning, learning, game-playing, and planning, with an emphasis on computational issues. Specific topics include stochastic reasoning and search procedures, properties of problem encodings, issues of syntax and semantics in knowledge representation, constraint satisfaction methods and search procedures, and critically constrained problems and their relation to phase-transition phenomena. In addition, connections between artificial intelligence and other fields, such as statistical physics, operations research, and cognitive science are explored.

CS 6740 Advanced Language Technologies (also INFO 6300)

Fall, spring. 3 credits. Prerequisite: permission of instructor. Neither CS 4300 nor CS 4740 are prerequisites. Graduate-level introduction to technologies for the computational treatment of information in human-language form, covering modern natural-language processing (NLP) and/or information retrieval (IR). Possible topics include latent semantic analysis (LSA), clickthrough data for web search, language modeling, text categorization and clustering, information extraction, computational syntactic and semantic formalisms, grammar induction, and machine translation.

CS 6764 Reasoning about Knowledge

Fall. 4 credits. Prerequisites: mathematical maturity and acquaintance with propositional logic. Next offered 2010–2011.

Knowledge plays a crucial role in distributed systems, game theory, and artificial intelligence. The course considers formal models of knowledge and applications in these areas.]

CS 6780 Advanced Topics in Machine Learning

Fall or spring. 4 credits. Prerequisites: CS 4780 or equivalent, or CS 5780 or equivalent, or permission of instructor. Offered fall 2009.

Extends and complements CS 4780 and 5780, giving in-depth coverage of new and advanced methods in machine learning. In particular, we connect to open research questions in machine learning, giving starting points for future work. The content of the course reflects an equal balance between learning theory and practical machine learning, making an emphasis on approaches with practical relevance. Topics include support vector machines, clustering, Bayes nets, boosting, model selection, learning orderings, and inductive transfer.

CS 6782 Probabilistic Graphical Models (also BTRY 6790)

Fall. 4 credits. Prerequisites: probability theory (BTRY 4080 or equivalent), programming and data structures (CS 2110 or equivalent); a course in statistical methods is recommended but not required (BTRY 4090 or equivalent). Next offered 2010–2011.

For description, see BTRY 6790.]

CS 6810 Theory of Computing

Fall or spring. 4 credits. Prerequisites: CS 3810 and CS 4820 or 6820 or permission of instructor. Next offered 2010–2011.

Advanced treatment of theory of computation, computational-complexity theory, and other topics in computing theory.]

CS 6820 Analysis of Algorithms

Fall. 4 credits. Prerequisite: CS 4820 or graduate standing.

Methodology for developing and analyzing efficient algorithms. Understanding the inherent complexity of natural problems via polynomial-time algorithms, advanced data structures, randomized algorithms, approximation algorithms, and NP-completeness. Additional topics may include algebraic and number theoretic algorithms, circuit lower bounds, online algorithms, or algorithmic game theory.

CS 6822 Advanced Topics in Theory of Computing

Fall or spring. 4 credits. Prerequisite: CS 6810, 6820, or 6830 recommended, depending on the topic. Next offered 2010–2011.

An advanced study of current topics in the theory of computing. Topics may include algorithms, complexity, logic, cryptography, or theories of networks, information, and learning. Course may be repeated for credit.]

CS 6830 Cryptography

Fall. 4 credits. Prerequisites: general ease with algorithms and elementary probability theory, maturity with mathematical proofs (ability to read and write mathematical proofs).

Graduate introduction to cryptography. Topics include encryption, digital signatures, pseudo-random number generation, zero-knowledge, and basic protocols. Emphasizes fundamental concepts and proof techniques.

CS 6840 Algorithmic Game Theory

Fall or spring. 4 credits. Prerequisite: background in algorithms and graphs at level of CS 4820. No prior knowledge of game theory or economics assumed. Offered fall 2009.

Algorithmic game theory combines algorithmic thinking with game-theoretic or, more generally, economic concepts. This course focuses on problems arising from, and motivated by, the Internet and other decentralized computer networks. The most defining characteristic of the Internet is that it was not designed by a single central entity, but emerged from the complex interaction of many economic agents, such as network operators, service providers, designers, and users, in varying degrees of collaboration and competition. The course focuses on some of the many questions at the interface between algorithms and game theory that arise from this point of view. Topics include Nash equilibrium and general equilibrium, the price of anarchy, market equilibrium, social choice theory, mechanism design, and multicast pricing.

CS 6850 The Structure of Information Networks (also INFO 6850)]**CS 6860 Logics of Programs**

Spring. 4 credits. Prerequisites: CS 4810, 6810, and (MATH 4810 or CS/MATH 4860).

Topics in logics of programs and program verification. Possible topics include: Floyd/Hoare logic, modal logic, dynamic logic, temporal logic, process logic, automata on infinite objects and their relation to program logics, the Rabin tree theorem, the modal mu-calculus, games and alternating automata, applications to type inference, set constraints, Kleene algebra.

CS 7090 Computer Science Colloquium

Fall, spring. 1 credit. For staff, visitors, and graduate students interested in computer science. S–U grades only.

Weekly meeting for the discussion and study of important topics in the field.

CS 7190 Seminar in Programming Languages

Fall, spring. 1 credit. Prerequisite: CS 6110 or permission of instructor. S–U grades only.

CS 7192 Seminar in Programming Refinement Logics

Fall, spring. 4 credits. Prerequisite: permission of instructor.

Topics in programming logics, possibly including type theory, constructive logic, decision procedures, heuristic methods, extraction of code from proofs, and the design of proof-development and problem-solving systems.

CS 7320 Topics in Database Systems

Fall, spring. 4 credits. S–U grades only.

CS 7390 Database Seminar

Spring. 1 credit. Prerequisite: CS 6322 or permission of instructor. S–U grades only.

CS 7490 Systems Research Seminar

Fall, spring. 1 credit. S–U grades only.

CS 7690 Computer Graphics Seminar

Fall, spring. 3 credits.

[CS 7726 Evolutionary Computation and Design Automation (also MAE 6500)

Spring. 4 credits. Prerequisite: programming experience or permission of instructor. Next offered 2010–2011.

Seminar course in evolutionary algorithms and their application to optimization and open-ended computational design. Genetic algorithms, genetic programming, co-evolution, arms races and cooperation, developmental representations, learning, and symbiosis are covered. Topics include artificial life, evolutionary robotics, and applications in a variety of domains in science and engineering. Suitable for students interested in computational techniques for addressing open-ended design problems and in computational models of evolutionary discovery.]

CS 7790 Seminar in Artificial Intelligence

Fall, spring. 4 credits. Prerequisite: permission of instructor. S–U grades only.

CS 7794 Seminar in Natural Language Understanding

Fall, spring. 2 credits.

Informal weekly seminar in which current topics in natural language understanding and computational linguistics are discussed.

CS 7860 Introduction to Kleene Algebra

Spring. 4 credits. Prerequisites: CS 4810 and (CS 4860 or MATH 4810).

Kleene algebra is an algebraic system for describing and reasoning about sequential processes. Topics will include some subset of the following: Model theory, including language, relational, and trace models; matrix algebras and automata as matrices; formal power series in noncommuting variables; Salomaa's completeness theorem and Redko's theorem; deductive completeness; related structures including Conway's S-algebras and closed semirings; ideal completion; PSPACE completeness of the equational theory; Kleene algebra with tests; guarded strings and automata on traces; reduction of the Hoare theory to the equational theory; program schematology; commutative Kleene algebra; Brzozowski derivatives and Taylor's theorem; algebraic closure and Parikh's theorem; applications in program verification; coalgebraic theory.

CS 7890 Seminar in Theory of Algorithms and Computing

Fall, spring. 4 credits. Prerequisite: permission of instructor. S–U grades only.

CS 7893 Cryptography Seminar

Fall, spring. 1 credit.

Seminar for discussing recent or classical papers in cryptography.

CS 7999 Independent Research

Fall, spring. Prerequisite: permission of a computer science advisor.

Independent research or master of engineering project.

CS 9999 Thesis Research

Fall, spring. Prerequisite: permission of a computer science advisor. S–U grades only.
Doctoral research.

INFORMATION SCIENCE (INFO)

INFO 1300 Introductory Design and Programming for the Web (also CS 1300)

Fall. 4 credits.

The World Wide Web is both a technology and a pervasive and powerful resource in our society and culture. To build functional and effective web sites, students need technical and design skills as well as analytical skills for understanding who is using the web, in what ways they are using it, and for what purposes. In this course, students develop skills in all three of these areas through the use of technologies such as XHTML, Cascading Stylesheets, and PHP. Students study how web sites are deployed and used, usability issues on the web, user-centered design, and methods for visual layout and information architecture. Through the web, this course provides an introduction to the interdisciplinary field of information science.

INFO 2040 Networks (also ECON 2040, SOC 2090)

Spring. 4 credits.

For description, see ECON 2040.

INFO 2140 Cognitive Psychology (also COGST/PSYCH 2140)

Spring. 4 credits. Limited to 175 students.

Prerequisite: sophomore standing.
Graduate students, see INFO 6140.

For description, see PSYCH 2140.

INFO 2300 Intermediate Design and Programming for the Web (also CS 2300)

Spring. 3 credits. Prerequisite: INFO 1300 strongly recommended. Must be taken before INFO 3300.

Web programming requires the cooperation of two machines: the one in front of the viewer (client) and the one delivering the content (server). INFO 1300 concentrates almost exclusively on the client side. The main emphasis in INFO 2300 is learning about server side processing. Students begin with a short overview of the PHP server-side scripting language, then look at interactions with databases, learning about querying both on paper and via SQL. Through a succession of projects, students learn how to apply this understanding to the creation of an interactive data-driven site via PHP and the MYSQL database. Also considered are technologies such as Javascript and Ajax; techniques to enhance security, privacy, reliability, and ways of incorporating other programs. Toward the end of the course, students are shown how these development tools are working. Design and usability issues are emphasized. A major component of the course is the creation of a substantial web site.

[INFO 2310 Topics in Web Programming and Design]**INFO 2450 Communication and Technology (also COMM 2450)**

Fall, summer. 3 credits.

For description, see COMM 2450.

INFO 2921 Inventing an Information Society (also AMST/ECE/ENGRG 2980, HIST 2920, STS 2921)

Spring. 3 credits.

For description, see ENGRG 2980.

INFO 2950 Mathematical Methods for Information Science

Fall. 4 credits. Corequisite: MATH 2310 or equivalent.

Teaches basic mathematical methods for information science. Topics include graph theory, discrete probability, Bayesian methods, finite automata, Markov models, and hidden Markov models. Uses examples and applications from various areas of information science such as the structure of the web, genomics, natural language processing, and signal processing.

INFO 3200 New Media and Society (also COMM 3200)

Spring. 3 credits.

For description, see COMM 3200.

INFO 3300 Data-Driven Web Applications (also CS 3300)

Fall. 3 credits. Prerequisite: CS 2110 and (INFO 2300 or permission of instructor).

Introduces students to modern database systems and three-tier application development with a focus on building web-based applications using database systems. Concepts covered include the relational model, relational query languages, data modeling, normalization, database tuning, three-tier architectures, Internet data formats and query languages, server- and client-side technologies, and an introduction to web services. Students build a database-backed web site.

[INFO 3400 Psychology of Social Computing (also COMM 3400)]

Fall. 3 credits. Prerequisite: INFO 2450.
Next offered 2010–2011.

For description, see COMM 3400.]

INFO 3450 Human-Computer Interaction Design (also COMM 3450)

Fall. 3 credits. Prerequisite: INFO 2450.
May be taken concurrently with INFO 2450.

For description, see COMM 3450.

[INFO 3490 Media Technologies (also COMM 3490, STS 3491)]

Spring. 3 credits. Offered odd-numbered years. Next offered 2010–2011.

For description, see COMM 3490.]

[INFO 3551 Computers: From the 17th Century to the Dotcom Boom (also STS 3551)]**INFO 3561 Computing Cultures (also STS 3561)**

Spring. 4 credits. No technical knowledge of computer use presumed or required.
INFO 3551 and 3561 may be taken separately or in any order.

For description, see STS 3561.

INFO 3650 Technology and Collaboration (also COMM 3650)

Spring. 3 credits. Prerequisite: INFO 2450.

For description, see COMM 3650.

[INFO 3660 History and Theory of Digital Art (also ARTH 3650)]

Fall. 4 credits. Next offered 2010–2011.

For description, see ARTH 3650.]

INFO 4290 Copyright in the Digital Age (also COMM 4290)

Fall. 3 credits. Offered odd-numbered years.

For description, see COMM 4290.

INFO 4300 Information Retrieval (also CS 4300)

Fall. 3 credits. Prerequisite: CS/ENGRD 2110 or equivalent.

Studies the methods used to search for and discover information in large-scale systems. The emphasis is on information retrieval applied to textual materials, but there is some discussion of other formats. The course includes techniques for searching, browsing, and filtering information and the use of classification systems and thesauruses. The techniques are illustrated with examples from web searching and digital libraries.

INFO 4302 Web Information Systems (also CS 4302)

Spring. 3 credits. Prerequisites: CS 2110 and some familiarity with web site technology.

Examines the architecture of web information systems such as distributed digital libraries and electronic publishing systems. Many of the topics presented are the subject of current research and development at Cornell, other universities, and in standards organizations such as the World Wide Web Consortium. Course content mixes exploration of current tools for building web information systems such as XML, XSLT, and RDF with broader concepts such as techniques for knowledge representation and description, object models for content representation, and legal and economic impacts of web information. A theme that runs throughout the course is the relationship between traditional information environments, exemplified by libraries, and the distributed information environment of the web.

[INFO 4350 Seminar on Applications of Information Science (also INFO 6350)]**INFO 4400 Advanced Human-Computer Interaction Design (also COMM 4400)**

Spring. 3 credits. Prerequisites: INFO 2450.

For description, see COMM 4400.

INFO 4450 Seminar in Computer-Mediated Communication (also COMM 4450)

Spring. 3 credits. Prerequisite: INFO 2450.

For description, see COMM 4450.

INFO 4470 Social and Economic Data (also ILRLE 4470)

Fall. 4 credits. Prerequisites: calculus, IS statistics requirement, and one upper-level social science course, or permission of instructor.

Social and economic data drive decisions in public and private organizations, and quality decisions require quality data. This course focuses on data quality—conceptual fit, sampling and nonsampling error, timeliness, geographic detail, and dissemination—as well as legal and ethical issues in the data manufacturing process. Major emphasis is placed on public use microdata files of the U.S. Census Bureau and their role in the allocation of federal funds. These files include the Census of Population and Housing, Current Population Survey, American Housing Survey, Consumer Expenditure Survey, and American

Community Survey. The course is appropriate for upper-level undergraduate, professional master's, and doctoral students who will be users of data products, from the public and private sectors; and/or producers of data products for their organizations, working with existing data products from public and proprietary sources, as well as administrative or survey data collected by their organization.

INFO 4500 Language and Technology (also COMM 4500)

Spring. 3 credits. Prerequisite: INFO 2450 or permission of instructor.
For description, see COMM 4500.

INFO 4900 Independent Reading and Research

Fall, spring. 1-4 credits.
Independent reading and research for undergraduates.

INFO 4910 Teaching in Information Science, Systems, and Technology

Fall, spring. Variable credit.
Involves working as a T.A. in a course in the information science, systems, and technology major.

[INFO 5150 Culture, Law, and Politics of the Internet]

INFO 5300 The Architecture of Large-Scale Information Systems (also CS 5300)

Spring. 4 credits. Prerequisite: INFO/CS 3300 or CS 4320.
Deals with the architecture of large-scale information systems, with special emphasis on Internet-based systems. Topics include three-tier architectures, edge caches, distributed transaction management, web services, workflows, performance scalability, and high-availability architectures. The course includes a substantial project in the context of three-tier architectures, involving web servers, application servers, and database systems. Students study and use technologies such as Web Services, .Net, J2EE, ASPs, Servlets, XML, and SOAP.

INFO 6140 Cognitive Psychology (also COGST/PSYCH 6140)

Spring. 4 credits.
For description, see PSYCH 6140.

INFO 6300 Advanced Language Technologies (also CS 6740)

Fall or spring. 3 credits. Prerequisites: permission of instructor. Neither INFO/CS 4300 nor CS 4740 are prerequisites.
For description, see CS 6740 in CIS section.

INFO 6341 Information Technology in Sociocultural Context (also STS 6341)

Spring. 4 credits.
Analyzes information technology using historical, qualitative, and critical approaches. Discusses questions such as: In what ways is information technology—often portrayed as radically new—actually deeply historical? How do information technologies represent and intervene in debates and struggles among people, communities, and institutions? How is the design of information technology tools entangled in the realms of law, politics, and commerce? In what ways are the social consequences of information technologies produced as much by the claims we make about the technologies as about the raw functionality of the tools themselves? This course investigates these issues through the

lenses of long-standing debates and current controversies.

[INFO 6350 Seminar on Applications of Information Science (also INFO 4390)]

INFO 6400 Human-Computer Interaction Design (also COMM 6400)

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor.
For description, see COMM 6400.

INFO 6450 Seminar in Computer-Mediated Communication (also COMM 6450)

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor.
For description, see COMM 6450.

[INFO 6648 Speech Synthesis by Rule (also LING 6648)]

Spring. 4 credits. Prerequisite: LING 4401, 4419, or permission of instructor. Next offered 2010-2011.
For description, see LING 6648.]

INFO 6500 Language and Technology (also COMM 6500)

Spring. 3 credits.
For description, see COMM 6500.

[INFO 6850 The Structure of Information Networks (also CS 6850)]

INFO 7050 Graduate Seminar

Fall, spring. 2 credits.
Graduate seminar on new research in the field of Information Science.

INFO 7090 IS Colloquium

Fall, spring. 1 credit.
For staff, visitors, and graduate students interested in information science.

INFO 7900 Independent Research

Fall, spring. Variable credit. Prerequisite: permission of an information science faculty member.
Independent research for M.Eng. students and pre-A exam Ph.D. students.

INFO 9900 Thesis Research

Fall, spring. Variable credit. Prerequisite: permission of an information science faculty member.
Thesis research for post-A exam Ph.D. students.

DEPARTMENT OF STATISTICAL SCIENCE

301 Malott Hall
255-8066

M. T. Wells, chair (301 Malott Hall, 255-4388); R. L. Strawderman, director of graduate studies; J. A. Bunge, director of professional programs; J. Abowd, T. Apanosovich, J. Booth, C. Bustamante, T. DiCiccio, R. Durrett, E. Dynkin, T. Fine, X. Guo, Y. Hong, G. Hooker, J. T. G. Hwang, N. Kiefer, G. Lawler, P. Li, F. Molinari, M. Nielsen, M. Nussbaum, P. Protter, S. Resnick, D. Ruppert, G. Samorodnitsky, S. J. Schwager (undergraduate coordinator), B. Turnbull, P. Velleman

STSCI 2010 Introductory Statistics

Fall or spring. 4 credits.
Introduction to the basic concepts of probability, statistics and data analysis. Descriptive methods, normal theory models, and inferential procedures are considered. Topics include basic statistical designs, an introduction to probability, estimation, confidence intervals, tests of significance for a single population mean and proportion, the difference in two population means and proportions, ANOVA, multiple linear regression, and contingency tables.

STSCI 5010-5020 Applied Statistical Analysis

Two-semester core course for students in master of professional studies (M.P.S.) degree program in applied statistics in Department of Statistical Science.
Prerequisite: enrollment in M.P.S. program.
Consists of a series of modules on various topics in applied statistics. Some modules include guest lectures from practitioners. Parallel with the course, students complete a yearlong, in-depth data analysis project.

Fall (STSCI 5010). 4 credits. Letter grades only.

Topics include but are not limited to: statistical computing systems, statistical software packages, data management, statistical graphics, and simulation methods and algorithms.

Spring (STSCI 5020). 4 credits. Letter grades only.

Topics include but are not limited to: sample surveys and questionnaire design, data sources, experimental design, and data mining.

STSCI 6000 Statistics Seminar

Fall and spring. 1 credit. Pre- or corequisite: BTRY 4090 or permission of instructor. S-U grades only.

FACULTY ROSTER

Computing and Information Science (CIS)

Abowd, John, Information Science Program;
School of Industrial and Labor Relations
Albonesi, David, School of Electrical and Computer Engineering
Arms, William, Dept. of Computer Science; Information Science Program
Bailey, Graeme, Dept. of Computer Science; Computing in the Arts Program
Bala, Kavita, Dept. of Computer Science; Program of Computer Graphics
Bindel, David, Dept. of Computer Science
Birman, Kenneth, Dept. of Computer Science
Birnholtz, Jeremy, Information Science Program; Dept. of Communication
Blume, Lawrence, Information Science Program; Dept. of Economics
Bunge, John, Dept. of Statistical Science; School of Industrial and Labor Relations
Cardie, Claire, Dept. of Computer Science; Information Science Program
Constable, Robert, Dept. of Computer Science
Demers, Alan, Dept. of Computer Science
Easley, David, Information Science Program; Dept. of Economics
Ernst, Kevin, Computing in the Arts Program; Dept. of Music
Fan, Kit-Yee Daisy, Dept. of Computer Science
Francis, Paul, Dept. of Computer Science
Gay, Geri, Information Science Program; Dept. of Communication

Gehrke, Johannes, Dept. of Computer Science
 Gillespie, Tarleton, Information Science Program; Dept. of Communication
 Ginsparg, Paul, Information Science Program; Dept. of Physics
 Gomes, Carla, Dept. of Computer Science; Dept. of Applied Economics and Management
 Greenberg, Donald, Dept. of Computer Science; Program of Computer Graphics; Johnson Graduate School of Management; Dept. of Architecture
 Gries, David, Dept. of Computer Science; College of Engineering
 Halpern, Joseph, Dept. of Computer Science; Information Science Program
 Hancock, Jeff, Information Science Program; Dept. of Communication
 Hartmanis, Juris, Dept. of Computer Science
 Hopcroft, John, Dept. of Computer Science
 Huttenlocher, Daniel, Dept. of Computer Science; Information Science Program; Johnson Graduate School of Management
 James, Doug, Dept. of Computer Science; Program of Computer Graphics
 Joachims, Thorsten, Dept. of Computer Science; Information Science Program
 Kedem, Klara, Dept. of Computer Science; Computational Biology Program
 Kleinberg, Jon, Dept. of Computer Science; Computational Biology Program; Information Science Program
 Kleinberg, Robert, Dept. of Computer Science
 Koch, Christoph, Dept. of Computer Science
 Kozen, Dexter, Dept. of Computer Science
 Kreitz, Christoph, Dept. of Computer Science
 Lee, Lillian, Dept. of Computer Science; Information Science Program
 Li, Ping, Dept. of Statistical Science
 Lipson, Hod, Computing and Information Science Program; School of Mechanical and Aerospace Engineering
 Macy, Michael, Information Science Program; Dept. of Sociology
 Marschner, Steve, Dept. of Computer Science; Program of Computer Graphics
 Myers, Andrew, Dept. of Computer Science
 Nussbaum, Michael, Dept. of Statistical Science; Dept. of Mathematics
 Pass, Rafael, Dept. of Computer Science
 Rooth, Mats, Information Science Program; Dept. of Linguistics
 Schneider, Fred, Dept. of Computer Science
 Selman, Bart, Dept. of Computer Science
 Sengers, Phoebe, Information Science Program; Dept. of Science and Technology Studies
 Siepel, Adam, Computational Biology Program; Dept. of Biological Statistics and Computational Biology
 Sirer, Emin Gun, Dept. of Computer Science
 Snaveley, Noah, Dept. of Computer Science
 Tardos, Eva, Dept. of Computer Science; Information Science Program
 Teitelbaum, Tim, Dept. of Computer Science
 Thurston, William, Computing and Information Science Program; Dept. of Mathematics
 Van Loan, Charles, Dept. of Computer Science; Computational Science and Engineering Program
 Weatherspoon, Hakim, Dept. of Computer Science
 Wells, Martin, Dept. of Statistical Science; Computational Biology Program
 Williamson, David, Information Science Program; School of Operations Research and Industrial Engineering
 Zabih, Ramin, Dept. of Computer Science

SCHOOL OF CONTINUING EDUCATION AND SUMMER SESSIONS

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SCHOOL ADMINISTRATION

Glenn C. Altschuler, dean

Charles W. Jermy, Jr., associate dean, and director, Cornell University Summer Session

Diane E. Sheridan, director, finance and administration

Ruby D. Brown, assistant director, finance and administration

School Program Directors and Managers

Mary E. Adie, director, Special Programs and Executive Education

Robert Hutchens, director, Cornell in Washington Program

Abby H. Eller, director, Summer College Programs for High School Students

Catherine Penner, director, Cornell's Adult University and Cornell CyberTower

School Support Services

Graham Dobson, manager, information technologies

Ann L. Morse, manager, media services

Cathy M. Pace, registrar, and coordinator, continuing education information service

CORNELL'S ADULT UNIVERSITY

Believing that learning shouldn't end once you've earned your degree, Cornell's Adult University (CAU) offers weeklong noncredit courses on campus in the summer for adults and families. During the fall, winter, and spring, CAU offers weekend seminars and longer domestic programs as well as international study tours. Developed and led by distinguished members of the Cornell faculty, all programs are inspired by the conviction that one of the roles of a great university is to provide a bridge between traditional formal education and informal, noncredit study. For information, visit www.cau.cornell.edu, e-mail cauinfo@cornell.edu, call 607 255-6260, or write to Cornell's

Adult University, 626 Thurston Avenue, Ithaca, NY 14850-2490.

CONTINUING EDUCATION INFORMATION SERVICE

If you know someone who has been out of school for several years and who wants to resume his or her education, you may want to mention Cornell's Continuing Education Information Service, which provides counseling, referral, and news about short courses, workshops, professional updates, and executive programs offered by the university. For information, e-mail cusce@cornell.edu, call 607 255-4987, or write to Continuing Education, B20 Day Hall, Ithaca, NY 14853-2801.

CORNELL CYBERTOWER: FREE FACULTY LECTURES AND INTERVIEWS ONLINE

Meet Cornell faculty members and explore fascinating topics for free at Cornell CyberTower, which features three online program series:

- **Study Rooms** contain video-streamed lectures, links to specially selected web sites, reading lists, and discussion boards with Cornell faculty members and fellow CyberTower users.
- **Forums** are informal video-streamed conversations with leading faculty members. Discussion boards enable you to trade comments and questions with each month's featured guest.
- **Views and Reviews** are brief, unabashedly opinionated commentaries by faculty members on books, films, articles, and topics in the news.

To explore CyberTower, simply log on to www.cybertower.cornell.edu. It's a great way to see some of what Cornell has to offer! In fact, why not share it with your family and friends?

CORNELL IN WASHINGTON PROGRAM

If you want to combine the strengths of Cornell with all of the best parts of living and learning in Washington, D.C., consider the Cornell in Washington program. Students take courses in the fall, spring, or summer for credit, work as externs, and complete substantial research projects while enjoying the rich opportunities available in the nation's capital. For information, visit www.ciw.cornell.edu, e-mail cwash@cornell.edu, call 607 255-4090, or write to Cornell in Washington, M101 McGraw Hall, Ithaca, NY 14853-4601.

DISTANCE LEARNING

Need a flexible schedule? Planning to travel or work during winter break or during the summer? Don't let that stop you from taking a class, earning credits, or learning something new. Wherever you are, whatever your schedule, Cornell distance learning courses are just a keyboard away. Distance learning courses feature web-based components and/or related materials. You'll interact with the instructor and other students by phone or e-mail. Most assignments and examinations are completed within a scheduled time frame, just as in on-campus courses, but you'll have the option of getting a head start on readings and lectures. For information, visit www.sce.cornell.edu/dl, e-mail cusce@cornell.edu, call 607 255-4987, or write to Distance Learning, B20 Day Hall, Ithaca, NY 14853-2801.

If you are a faculty member interested in developing credit or noncredit distance learning courses, the school offers a broad range of services, including determining technological needs, resolving copyright issues, creating a marketing plan, and fulfilling administrative duties related to your course. Visit www.sce.cornell.edu/dl to see what's possible.

EXECUTIVE AND PROFESSIONAL PROGRAMS

Once you're out in the work world (or if you know folks who already are), you may be interested in the short, high-level executive education programs that the school presents on campus, online, and in locations worldwide. These courses are taught by Cornell faculty and senior research staff members in many fields. Programs also can be designed to respond to the specific needs and interests of corporations, professional societies, and other groups. For information, visit www.sce.cornell.edu/exec, e-mail culp@cornell.edu, call 607 255-7259, or write to Executive Education, B20 Day Hall, Ithaca, NY 14853-2801.

EXTRAMURAL/PART-TIME STUDY

If you find your studies interrupted for any reason, you may find it useful to take classes on a part-time basis. The school is also dedicated to offering part-time study to staff and faculty members, area residents, and anyone else interested in taking courses at the university, improving their job skills, continuing their education, or simply having fun learning something new.

Thanks to the school's Extramural Study program, anyone may (with few exceptions) enroll in any course in the university during the fall and spring semesters if space is available. Part-time study at Cornell is a great opportunity to take fascinating course offerings and study with world-renowned faculty members. If you'd like to take advantage of Cornell's extensive course offerings but don't need college credit, you

may register through the Visitors Program and receive a 90 percent discount on tuition. For information, visit www.sce.cornell.edu/exmu, e-mail cusce@cornell.edu, call 607 255-9697, or write to Extramural Study, B20 Day Hall, Ithaca, NY 14853-2801.

SPECIAL PROGRAMS

If you want to immerse yourself in a particular subject, consider enrolling in a special program. Programs are offered on and off campus, may include an internship, and may be combined with other courses. For information, visit www.sce.cornell.edu/sp, e-mail culp@cornell.edu, call 607 255-7259, or write to Special Programs, B20 Day Hall, Ithaca, NY 14853-2801.

On-Campus Special Programs Roster

AEM Certificate in Business Management
 Architecture
 Art in the Modern World
 Asian Language Programs: Chinese, Japanese, Nepali, Sinhala, Tibetan
 Astronomy for Teachers
 Biological Sciences Undergraduate Research Program
 CCMR Institute for Chemistry Teachers (CICT)
 CNS Institute for Physics Teachers (CIPT)
 Cornell Institute for Biology Teachers (CIBT)
 Ecological Design in Paris and London Education
 Engineering Cooperative Education Program
 English for International Students and Scholars
 Field Course in Iroquois Archaeology
 Freshman Summer Start
 Frontiers of American History
 Industrial and Labor Relations: Strategic Corporate Research
 Intensive Arabic Program
 Landscape Architecture: Site Grading
 Leadership Program for Veterinary Students
 Nanobiotechnology Institute for Teachers
 Prefreshman Summer Program
 Satellite Remote Sensing Applications in Biological Oceanography
 Teaching Writing

Off-Campus Special Programs Roster

Art Studio and Creative Writing Workshop in Rome, Italy
 Theatre, Film, and Dance in Europe: Dublin/Paris/Rome
 High Technology Entrepreneurship Program
 Human Ecology: Urban Semester Program—Fieldwork in Diversity, Professional Practice, and Service: The Culture of Medicine/Community and Public Service/Business and Finance
 International Business Experience
 Investment Management Program
 Latin American Studies: Quechua

Marine Science: Shoals Marine Laboratory, Maine

Prelaw Program in New York City

Summer in Washington

Campus to Careers

The job market's tough. The economy's tight. You've been thinking it's time to get serious about your future

The School of Continuing Education and Summer Sessions invites you to join us for one of our highly regarded programs linking classrooms and careers. No matter what your major is, you can:

- Expand your career opportunities
- Strengthen your résumé and skills
- Develop professional contacts
- Take focused, intensive classes
- Learn from distinguished professors, alumni, practitioners, and executives
- Study in Washington, D.C., New York City, Silicon Valley, Europe, or on the Cornell campus in Ithaca
- Enrich your personal, academic, and professional life

For more information, visit www.sce.cornell.edu/sp.

Campus-to-Careers Programs Roster

AEM Certificate in Business Management
 High Technology Entrepreneurship Program
 International Business Experience
 Investment Management Program
 Prelaw Program in New York City
 Summer in Washington

SUMMER COLLEGE PROGRAMS FOR HIGH SCHOOL STUDENTS

If you know any high school students, be sure to tell them about Summer College. This award-winning program offers three- and six-week courses for talented sophomores, juniors, and seniors from around the world.

Participants live on our beautiful campus, take college classes with leading Cornell faculty members, earn an average of 6 credits, and explore careers and academic majors.

The program is a wonderful opportunity for high school students to experience college life and make some great friends. At the end of the program, students often say it's been the best summer of their life.

For information, visit www.summercollege.cornell.edu, e-mail summer_college@cornell.edu, call 607 255-6203, or write to Summer College, B20 Day Hall, Ithaca, NY 14853-2801.

WINTER SESSION

You can earn up to 4 credits between the fall and spring semesters by enrolling in the winter session. During this quiet time on campus, you'll enjoy generally smaller classes and be able to concentrate on intensive study with a faculty member. Our winter session

roster appears below. If a course is also offered through distance learning, the course title will be followed by **DL**.

For information, visit www.sce.cornell.edu/ws, e-mail cusce@cornell.edu, call 607 255-4987, or write to Winter Session, B20 Day Hall, Ithaca, NY 14853-4987.

Winter Session Course Roster

AEM 2400 Marketing **DL**
 AMST 2020 Popular Culture in the United States, 1950 to Present **DL**
 AMST 3141 Prisons **DL**
 ARCH 3819 Special Topics in the History of Architecture and Urbanism
 ARTH 2600 Introduction to Art History: The Modern Era
 ARTH 4525 Rastafari, Race, and Resistance **DL**
 ASIAN 2250 Introduction to Asian Religions
 ASIAN 2299 Buddhism
 ASRC 1100–1101 Elementary Swahili (off campus)
 ASRC 4526 Rastafari, Race, and Resistance **DL**
 BIOEE 2640 Tropical Field Ornithology (off campus)
 BIOEE 2650 Tropical Field Ecology and Behavior (off campus)
 BIOMI 1720 Bioscientific Terminology
 CLASS 1692 Bioscientific Terminology
 COMM 2630 Organizational Writing
 COMM 2720 Principles of Public Relations and Advertising **DL**
 ECON 1110 Introductory Microeconomics **DL**
 ECON 1120 Introductory Macroeconomics
 ENGL 2810 Creative Writing
 ENGL 2880 Expository Writing
 GOVT 1615 Introduction to Political Philosophy **DL**
 GOVT 3141 Prisons **DL**
 NBA 5910 Business in Emerging Markets
 ORIE 3150 Financial and Managerial Accounting
 RELST 2290 Buddhism
 VISST 4625 Rastafari, Race, and Resistance **DL**

CORNELL UNIVERSITY SUMMER SESSION

Summer at Cornell is an excellent time to get a world-class education while enjoying all of the pleasures of summer in the Finger Lakes.

Summer Session features open admissions and outstanding instructors, nearly all of whom are regular Cornell faculty members. Courses are offered on and off campus and via distance learning.

During our three-, six-, or eight-week sessions, you can actually get to know your professors and are sure to be surrounded by intriguing people of all ages from all over the world. And you'll still have time left over for travel or a summer job!

During Summer Session you can fulfill requirements, accelerate your degree, gain personal satisfaction, grow professionally, and/or ease your fall/spring course load. It's also the perfect time to take advantage of the area's stunningly beautiful gorges, waterfalls, lakes, and parks. Hike, swim, sail, picnic, or enjoy a sunset concert on the Arts Quad. However you look at it, spending a summer at Cornell is a great way to enjoy the best of the university and the best of summer!

For information, visit www.summer.cornell.edu, e-mail cusce@cornell.edu, call 607 255-4987, or write to Summer Session, B20 Day Hall, Ithaca, NY 14853-4987.

Summer Session Course Roster

The Cornell University Summer Session offers a wide variety of courses. The list that follows includes those courses that are usually offered every summer. The list is not exhaustive; many new courses or courses offered only occasionally are not listed. For complete information, contact the Summer Session office. Courses are posted on the web (www.summer.cornell.edu) in the fall as the roster is developed. If a course also is offered through distance learning, the course title will be followed by **DL**.

Africana Studies

- ASRC 1100-1101 Elementary Swahili
- ASRC 1104-1105 Elementary Arabic
- ASRC 1106-2101 Intermediate Arabic
- ASRC 1900 Research Strategies
- ASRC 2300 African Cultures and Civilizations
- ASRC 4505 Black Arts Movement **DL**
- ASRC 4606 The Family and Society in Africa

American Indian Studies

- AIS 2220 Field Course in Iroquois Archaeology

American Studies

- AMST 1240 Democracy and Its Discontents: Political Traditions in the United States
- AMST 2020 Popular Culture in the United States, 1950 to Present **DL**
- AMST 2525 Islam in America
- AMST 2820 Photography and the American Landscape
- AMST 3128 America's Changing Faces

- AMST 3140 History of American Foreign Policy, 1912 to the Present

- AMST 3141 Prisons **DL**

- AMST 4509 Black Arts Movement **DL**

Animal Science

- ANSC 1120 Sustainable Animal Husbandry
- ANSC 2140 Captive Raptor Management and Propagation
- ANSC 2250 Fertilization and New Life Technologies

Anthropology

- ANTHR 1300 Human Evolution: Genes, Behavior, and the Fossil Record **DL**
- ANTHR 2112 Cosmology of Native North America
- ANTHR 2220 Field Course in Iroquois Archaeology
- ANTHR 3305 Anthropology of Parenting **DL**
- ANTHR 3415 Art in the Modern World
- ANTHR 3799 Women in Asia: Sex and Gender in Cross-Cultural Perspective

Applied Economics and Management

- AEM 1200 Introduction to Business Management
- AEM 2190 Introduction to Applied Portfolio Management
- AEM 2210 Financial Accounting
- AEM 2240 Principles of Finance
- AEM 2260 AEM Certificate in Business Management Special Activities
- AEM 2270 Introduction to International Business
- AEM 2400 Marketing **DL**
- AEM 3200 Business Law I

Archaeology

- ARKEO 2220 Field Course in Iroquois Archaeology
- ARKEO 3003 Island Archaeology
- ARKEO 3302 Archaeology Under Water

Other field study opportunities are usually available through this department.

Architecture

- ARCH 1102 Design II
- ARCH 1110 Introduction to Architecture: Design Studio
- ARCH 1300 An Introduction to Architecture: Lectures
- ARCH 2100 Elective Design Studio
- ARCH 2101 Design III
- ARCH 2102 Design IV
- ARCH 2603 Structural Concepts

- ARCH 2604 Structural Elements
- ARCH 3100 Elective Design Studio
- ARCH 3101 Design V
- ARCH 3102 Design VI
- ARCH 4100 Elective Design Studio
- ARCH 4101 Design VII
- ARCH 4102 Design VIII
- ARCH 5101 Design IX
- ARCH 5603 Structural Concepts
- ARCH 5604 Structural Elements

Art

- ART 1001 Art as Experience
- ART 1201 Introductory Painting
- ART 1301 Introductory Intaglio
- ART 1401 Introductory Sculpture
- ART 1500-1503 Summer Drawing
- ART 1505 Drawing in Rome
- ART 1601 Photography I
- ART 1608 Black-and-White Photography
- ART 1609 Color Photography
- ART 1701 Electronic Imaging in Art
- ART 2201 Painting II
- ART 2301 Intaglio II
- ART 2401 Sculpture II
- ART 2601 Photography II
- ART 2603 Color Photography
- ART 3601 Photography III
- ART 3702 Special Topics in Art Studio
- ART 4509 Independent Studies in Drawing

Asian Studies

- ASIAN 2225 Literature, Politics, and Genocide in Cambodia **DL**
- ASIAN 2279 Chinese Mythology

Chinese

- CHIN 1159 Summer Intensive Mandarin
- CHIN 1160 Introductory Intensive Mandarin
- CHIN 2201-2202 Intermediate Mandarin

Japanese

- JAPAN 1159 Summer Intensive Japanese (FALCON)
- JAPAN 1160 Introductory Intensive Japanese (FALCON)

Nepali

- NEPAL 1160 Intensive Nepali
- NEPAL 2260 Intermediate Intensive Nepali
- NEPAL 3360 Advanced Intensive Nepali

Astronomy

- ASTRO 1105–1107 An Introduction to the Universe
- ASTRO 1106 Essential Ideas in Relativity and Cosmology
- ASTRO 6501 Astro Education for Teachers

Biological Sciences

General Courses

- BIOG 1007–1008 Support for Upper-Class Seminar Scholarship Program
- BIOG 1107–1108 General Biology
- BIOG 2000 Special Studies in Biology
- BIOG 6020 CIBT: Molecular Biology for Teachers

Ecology and Evolutionary Biology

- BIOEE 2070 Evolution
- BIOEE 2610 Ecology and the Environment
- BIOEE 4670 Seminar in the History of Biology

Microbiology

- BIOMI 1720 Bioscientific Terminology
- BIOMI 2900–2910 General Microbiology

Molecular Biology and Genetics

- BIOGD 2800 Lectures in Genetics
- BIOGD 2810 Genetics
- BIOBM 3330 Principles of Biochemistry: Proteins, Metabolism, and Molecular Biology
- BIOBM 4320 Survey of Cell Biology
- BIOBM 4400 Laboratory in Biochemistry and Molecular Biology

Neurobiology and Behavior

- BIONB 2213 Neurobiology and Behavior I: Introduction to Behavior
- BIONB 3290 Ecology of Animal Behavior

Plant Biology

- BIOPL 1120 Issues in Social Biology: Diet to Diseases, DNA to Deforestation
- BIOPL 2400 Green World/Blue Planet
- BIOPL 2450 Plant Biology

Shoals Marine Laboratory

- BIOSM 1110 A Marine Approach to Introductory Biology
- BIOSM 1551 Introduction to Oceanography Lab at Shoals
- BIOSM 1600 The Oceanography of the Gulf of Maine
- BIOSM 1620 Marine Environmental Science
- BIOSM 2040 Biological Illustration
- BIOSM 2100 Boats for Biologists
- BIOSM 2760 Seabird Ecology and Conservation

- BIOSM 2770 Introduction to Marine Conservation Biology
- BIOSM 3060 Evolution of Ancient and Modern Oceans
- BIOSM 3080 Field Microbial Ecology
- BIOSM 3110 Science Writing
- BIOSM 3120 Biology of the Lobster
- BIOSM 3210 Anatomy and Function of Marine Vertebrates
- BIOSM 3220 Ecology of Biological Invasion
- BIOSM 3290 Ecology of Animal Behavior
- BIOSM 3640 Field Marine Science
- BIOSM 3650 Underwater Research
- BIOSM 3740 Field Ornithology
- BIOSM 3750 Field Marine Biology and Ecology
- BIOSM 3770 Diversity of Fishes
- BIOSM 4130 Research in Marine Biology
- BIOSM 4450 Forensic Science for Marine Biologists
- BIOSM 4650 The Biology, Evolution, and Conservation of Sharks and Their Allies
- BIOSM 4720 Marine Phylogenomics
- BIOSM 4990 Research in Biology

Biology and Society

- BSOC 4471 Seminar in the History of Biology

Chemistry and Chemical Biology

- CHEM 1560 Introduction to General Chemistry
- CHEM 1570 Introduction to Organic and Biological Chemistry
- CHEM 2070–2080 General Chemistry
- CHEM 2510 Introduction to Experimental Organic Chemistry
- CHEM 3570–3580 Organic Chemistry for the Life Sciences
- CHEM 5010 Contemporary Chemistry for Teachers

Classics

- CLASS 1692 Anatomy of Bioscientific Terminology
- CLASS 2604 Greek Mythology
- CLASS 2681–2682 History of Rome

Cognitive Studies

- COGST 1101 Introduction to Cognitive Science

Communication

- COMM 2010 Oral Communication
- COMM 2030 Argumentation and Debate
- COMM 2200 Communication Media

- COMM 2450 Psychology of Social Computing
- COMM 2630 Organizational Writing
- COMM 2720 Principles of Public Relations and Advertising **DL**
- COMM 3520 Science Writing for the Mass Media
- COMM 3760 Planning Communication Campaigns

Comparative Literature

- COML 2360 Greek Mythology

Computer Science

- CS 1109 Fundamental Programming Concepts
- CS 1110 Introduction to Computing Using Java
- CS 1710 Introduction to Cognitive Science
- CS 2110 Object-Oriented Programming and Data Structures
- CS 3220 Introduction to Scientific Computation
- CS 3810 Introduction to Theory of Computing
- CS 4820 Introduction to Analysis of Algorithms

Design and Environmental Analysis

- DEA 4000 Directed Readings
- DEA 4010 Empirical Research
- DEA 4020 Supervised Fieldwork

Earth and Atmospheric Sciences

- EAS 1108 Earth in the News
- EAS 1150 Severe Weather Phenomena
- EAS 1540 The Sea: An Introduction to Oceanography, Lectures
- EAS 3060 Evolution of Ancient and Modern Oceans
- EAS 4170 Field Mapping in Argentina
- EAS 4750 Special Topics in Oceanography
- EAS 7500 Satellite Remote Sensing in Biological Oceanography

Economics

- ECON 1110 Introductory Microeconomics **DL**
- ECON 1120 Introductory Macroeconomics
- ECON 3130 Intermediate Microeconomic Theory (calculus)
- ECON 3140 Intermediate Macroeconomic Theory (calculus)
- ECON 3210 Applied Econometrics
- ECON 4340 Financial Economics, Derivatives, and Risk Management

Engineering**Communication Courses**

ENGRC 3500 Engineering Communications

Distribution Courses

ENGRD 2030 Dynamics

ENGRD 2110 Object-Oriented
Programming and Data Structures

ENGRD 2210 Thermodynamics

ENGRD 2700 Basic Engineering Probability
and Statistics

ENGRD 3220 Introduction to Scientific
Computation

Applied and Engineering Physics

AEP 3210 Mathematical Physics I

AEP 3330 Mechanics of Particles and Solid
Bodies

AEP 3550 Intermediate Electromagnetism

AEP 3610 Introductory Quantum Mechanics

**Biological and Environmental
Engineering**

BEE 3299 Sustainable Development: A
Web-Based Course

BEE 3310 Bio-Fluid Mechanics

BEE 3500 Biological and Environmental
Transport Processes

Chemical and Biomolecular Engineering

CHEME 3130 Chemical Engineering
Thermodynamics

CHEME 3240 Heat and Mass Transfer

Civil and Environmental Engineering

CEE 3230 Engineering Economics and
Management

CEE 3310 Fluid Mechanics

CEE 3610 Introduction to Transportation
Engineering

CEE 4710 Fundamentals of Structural
Mechanics

Electrical and Computer Engineering

ECE 3030 Electromagnetic Fields and
Waves

ECE 3100 Introduction to Probability and
Random Signals

ECE 3130 Computerized Instrumentation
Interface Design

Materials Science and Engineering

MSE 3010 Materials Chemistry

MSE 3030 Thermodynamics of Condensed
Systems

Mechanical and Aerospace Engineering

MAE 2120 Mechanical Properties and
Selection of Engineering Materials

MAE 3230 Introductory Fluid Mechanics

MAE 3240 Heat Transfer

MAE 3250 Analysis of Mechanical and
Aerospace Structures

MAE 3260 System Dynamics

**Operations Research and Information
Engineering**

ORIE 3150 Financial and Managerial
Accounting

ORIE 3300-3310/5300-5310 Optimization

ORIE 3500/5500 Engineering Probability
and Statistics II

ORIE 3510 Introductory Engineering
Stochastic Processes I

ORIE 5510 Introduction to Stochastic
Processes I

Systems Engineering

SYSEN 1100 Getting Design Right: A
Systems Approach **DL**

Theoretical and Applied Mechanics

TAM 2030 Dynamics

TAM 3100 Introduction to Applied
Mathematics I

English

ENGL 1131 FWS: Reading and Writing
About . . . ?

ENGL 1132 FWS: The Personal Essay

ENGL 2090 Introduction to Cultural Studies

ENGL 2270 Shakespeare

ENGL 2800-2810 Creative Writing

ENGL 2880-2890 Expository Writing

ENGL 3830 Narrative Writing

ENGL 3850 Verse Writing

ENGL 4810 Seminar in Writing

ENGL 4820 Hamlet: the Seminar

ENGL 4950 Independent Study

ENGL 7950 Group Study

English as a Second Language

ENGLF 1011 English as a Second
Language

English for Later Bilinguals

ENGLB 1115 English for Later Bilinguals

**Feminist, Gender, and Sexuality
Studies**

FGSS 3890 Women in Asia: Sex and
Gender in Cross-Cultural Perspective

French

FREN 2090 French Intermediate
Composition and Conversation I

German Studies

GERST 2250 Genius and Madness in
Literature

Government

GOVT 1111 Introduction to American
Government and Politics

GOVT 1615 Introduction to Political
Philosophy **DL**

GOVT 1817 Introduction to International
Relations

GOVT 3071 Introduction to Public Policy

GOVT 3128 America's Changing Faces

GOVT 3141 Prisons **DL**

GOVT 3150 The American Legal System:
Its Nature, Functions, and Institutions

GOVT 3303 Politics of the Global North

GOVT 3937 Introduction to Peace Studies

Greek

GREEK 1103 Intensive Greek

History

HIST 1240 Democracy and Its Discontents:
Political Traditions in the United States

HIST 1510-1511 Introduction to Western
Civilization

HIST 2670-2671 History of Rome

HIST 2870 Evolution

HIST 3140 History of American Foreign
Policy, 1912 to the Present

HIST 3710 World War II in Europe

HIST 4150 Seminar in the History of Biology

HIST 6211-6213 Frontiers of American
History

History of Art

ARTH 2402 Survey of European Art:
Renaissance to Modern

ARTH 2672 Art, Politics, and Social
Imagination: Art of the Avant-Gardes

ARTH 3100 History of Photography

ARTH 3915 Art in the Modern World

ARTH 4509 Black Arts Movement **DL**

ARTH 4526 Caribbean Dialogs **DL**

Hotel Administration

HADM 1101 Hotel Operations
Management: Tactics for Profitability

HADM 2225 Finance

HADM 4441 Strategic Management

Human Development

HD 1150 Human Development

HD 1160 Section for Introduction to Human
Development

HD 2160 Adolescence and Emerging
Adulthood

Human Ecology

HE 1100 Critical Reading and Thinking

HE 4060/4080/4090 Fieldwork in Diversity
and Professional Practice

Industrial and Labor Relations
Collective Bargaining, Labor Law, and Labor History

ILRCB 1100 Introduction to United States Labor History

ILRCB 4080 Strategic Corporate Research

Human Resource Studies

ILRHR 2660 Essential Desktop Applications

ILRHR 4620 Staffing Organizations

International and Comparative Labor

ILRIC 4330/6330 Politics of the Global North

Labor Economics

ILRLE 2400 Economics and Wages of Employment

Organizational Behavior

ILROB 1220 Introduction to Organizational Behavior

Social Statistics

ILRST 2100 Introductory Statistics **DL**

ILRST 5100–5110 Statistical Methods for the Social Sciences **DL**

Information Science

INFO 2450 Psychology of Social Computing

Italian

ITAL 3270 Ancient/Modern Corpo-Realities

Jewish Studies

JWST 1104 Beginners' Intensive Hebrew

Landscape Architecture

LA 2820 Photography and the American Landscape

LA 6000 Site Grading Workshop

Latin

LATIN 1203 Intensive Latin

Latino Studies Program

LSP 1101 Research Strategies

Linguistics

LING 1111–1112 American Sign Language

LING 1170 Introduction to Cognitive Science

Marine Science

Consult related department listings for summer offerings in marine science.

Mathematics

MATH 1009 Precalculus Mathematics

MATH 1110 Calculus I

MATH 1350 The Art of Secret Writing

MATH 1710 Statistical Theory and Application in the Real World

MATH 1910 Calculus for Engineers

MATH 1920 Multivariate Calculus for Engineers

MATH 2930 Differential Equations for Engineers

MATH 2940 Linear Algebra for Engineers

MATH 5080 Mathematics for Secondary School Teachers

Music

MUSIC 1105 Introduction to Music Theory

MUSIC 1421 Introduction to Computer Music

MUSIC 3610 Cornell Gamelan Ensemble

MUSIC 3621 Cornell Summer Symphony Orchestra

Natural Resources

NTRES 1102 Introduction to Environmental Studies

Near Eastern Studies

NES 1104 Beginners' Intensive Hebrew

NES 1201–1202 Elementary Arabic

NES 1203–2200 Intermediate Arabic

NES 2525 Islam in America

Nutritional Sciences

NS 1150 Nutrition, Health, and Society **DL**

Philosophy

PHIL 1100 Introduction to Philosophy

PHIL 1450 Contemporary Moral Issues

PHIL 1512 Philosophy and Film

PHIL 1810 Introduction to the Philosophy of Science

PHIL 1910 Introduction to Cognitive Science

PHIL 2200 Ancient Philosophy

Physical Education

Consult the Physical Education office for a complete list of summer offerings for credit and recreation.

Physics

PHYS 1101–1102–1103 General Physics

PHYS 1112 Physics I: Mechanics

PHYS 2213 Physics II: Heat/Electromagnetism

PHYS 2214 Physics III: Optics, Waves, and Particles

PHYS 6501 Contemporary Physics for Teachers

PHYS 6502 Topics in Physics for Teachers

Psychology

PSYCH 1101 Introduction to Psychology: The Frontiers of Psychological Inquiry

PSYCH 1102 Introduction to Cognitive Science

PSYCH 1280 Personality and Social Psychology: The Individual in the Social World

PSYCH 1990 Sports Psychology

PSYCH 2800 Introduction to Social Psychology

PSYCH 3500 Statistics and Research Design

Quechua

QUECH 1210–1220 Elementary Quechua

QUECH 2090–2190 Continuing Quechua

Religious Studies

RELST 2250 Introduction to Asian Religions

RELST 2525 Islam in America

Science and Technology Studies

STS 1451 Body, Mind, and Health: Perspectives for Future Medical Professionals

STS 2871 Evolution

STS 3521 Science Writing for the Mass Media

STS 4471 Seminar in the History of Biology

Sociology

SOC 1101 Introduction to Sociology

SOC 4780 The Family and Society in Africa

Spanish

SPAN 1230 Continuing Spanish

Statistical Science

STSCI 2100 Introductory Statistics **DL**

Theatre, Film, and Dance

Theatre

THETR 2360 Public Voice and Civic Gesture

THETR 2870 Summer Acting Workshop

THETR 4470 Hamlet: The Seminar

Film Studies

FILM 1512 Philosophy and Film

FILM 3210 The Location of Italian Film History

FILM 3220 Poetic Montage

FILM 3240 Film Animation Workshop: Experimental and Traditional Animation on the Oxberry

FILM 3250 Animation History and Practice

FILM 3270 Ancient/Modern Corpo-Realities

Dance

DANCE 1250 Rehearsal and Performance

DANCE 2240 Dance Technique Workshop

- DANCE 2450 Public Voice and Civic Gesture
- DANCE 2480 Dance Improvisation
- DANCE 2500 Beginning Dance Composition
- DANCE 3210 Dance Technique III/Classical
- DANCE 3220 Dance Technique III/Modern
- DANCE 3500-3510 Intermediate Dance Composition
- DANCE 3580 Ancient/Modern Corporate Realities
- DANCE 4080 Seminar in Dance Studies
- DANCE 4210 Dance Technique IV/Classical
- DANCE 4220 Dance Technique IV/Modern
- DANCE 4510 Advanced Composition II

Visual Studies

- VISST 2360 Public Voice and Civic Gesture
- VISST 2511 Beginning Dance Composition
- VISST 2540 Dance Technique Workshop
- VISST 3210 Ancient/Modern Corporate Realities
- VISST 4210 Dance Technique IV/Classical
- VISST 4220 Dance Technique IV/Modern
- VISST 4580 Seminar in Dance Studies

Writing

- WRIT 1340 An Introduction to Writing in the University
- WRIT 7100 Teaching Writing

INDEPENDENT STUDY

Have a special interest you'd like to pursue?
 Want to do research and get credit for it?
 Need a particular course to graduate on time?
 Consider independent study.

Independent study encompasses courses of your own design, special topics courses, undergraduate research, or any regular course from the fall and spring semesters not being offered. If you can find a professor willing to supervise your study, all you need to do is pick up the application for independent study (available on the web at www.summer.cornell.edu or from the Summer Session office) and register in B20 Day Hall at least two weeks prior to beginning the independent study course. Also, please let the Summer Session office know if there are courses you would like to see offered next summer (e-mail cusce@cornell.edu or call 607 255-4987).

COLLEGE OF ENGINEERING

ADMINISTRATION

Christopher K. Ober, interim dean

David Gries, associate dean for undergraduate programs

Marjolein van der Meulen, interim associate dean for research and graduate studies

Richard Allmendinger, associate dean for diversity

Betsy East, assistant dean for student services

Cathy Dove, associate dean for administration

James Mazza, interim assistant dean for alumni affairs and development

FACILITIES AND SPECIAL PROGRAMS

Most of the academic units of the College of Engineering are on the Joseph N. Pew, Jr. Engineering Quadrangle. The School of Applied and Engineering Physics is located in Clark Hall on the College of Arts and Sciences campus, the Department of Biological and Environmental Engineering is in Riley-Robb Hall on the campus of the New York State College of Agriculture and Life Sciences, and the Department of Biomedical Engineering is in Weill Hall.

Special university and college facilities augment the laboratories operated by the various engineering schools and departments, and special centers, institutes, and programs contribute to opportunities for study and research.

Cornell programs and centers of interest in engineering include the following:

Center for Advanced Computing. CAC is a supercomputer facility used for advanced research in engineering and the physical and biological sciences.

Center for Applied Mathematics. This cross-disciplinary center administers a graduate program.

Center for Nanoscale Systems. The mission of this National Science Foundation Nanoscience and Technology Center is to develop innovative nanoscale systems to revolutionize information technology and to further nanoscience technology. The facilities for this center are distributed between Clark Hall and the Engineering Quadrangle, and especially in Duffield Hall.

Center for Radiophysics and Space Research. This interdisciplinary unit facilitates research in astronomy and the space sciences.

Cornell Center for Materials Research. CCMR is an interdisciplinary center that performs state-of-the-art materials research and provides sophisticated scientific measurement and characterization equipment.

Cornell Center for a Sustainable Future. This center promotes and advances collaborations across Cornell and with selected external partners, leveraging Cornell's resources to help build a sustainable future for the world.

Cornell High Energy Synchrotron Source. CHESS is a high-energy synchrotron radiation laboratory operated in conjunction with the university's high-energy storage ring. Current research programs at CHESS are in areas of structural biology, chemistry, materials science, and physics.

Cornell Nanoscale Science and Technology Facility (part of the National Science Foundation-funded National Nanofabrication Users Network). This center provides equipment and services for research in the science, engineering, and technology of nanometer-scale structures for electronic, chemical, physical, and biological applications.

CU-ADVANCE. The NSF ADVANCE program's goals are to increase the recruitment, retention, and promotion into leadership positions of women in engineering and the sciences, and to institutionalize best practices, policies, and programs across colleges as they pertain to women faculty.

Institute for Biotechnology and Life Sciences Technologies. This institute was established to promote the new discipline of modern biotechnology and the education and training of biologists, engineers, agricultural personnel, and medical scientists.

Institute for the Study of the Continents. This interdisciplinary organization promotes research in deep seismic exploration of the structure and geologic evolution of the continents.

Intelligent Information Systems Institute. IISI seeks to stimulate research in compute- and data-intensive methods for intelligent decision-making systems, to foster collaboration, and to play a leadership role in the research and dissemination results in its core areas.

KAUST-Cornell Center for Energy and Sustainability. This center investigates organic-inorganic hybrid nanomaterials for applications in water desalination, carbon capture and sequestration, oil and gas production, and solar energy.

Kavli Institute at Cornell for Nanoscale Science. KIC addresses challenges and opportunities for the science of very small structures and fosters collaborative multidisciplinary research in this area.

Laboratory of Atomic and Solid State Physics. This is a major center for research in the area of condensed matter physics and other related areas.

Laboratory of Plasma Studies. LPS is a center for research in plasma physics.

MCEER. This facility was established by the National Science Foundation and a group of universities to study the response and design of structures in earthquake environments.

Nanobiotechnology Center. The mission of this National Science Foundation Science and Technology Center is to develop nanoscale technologies and science applied to the life sciences. The facilities of this center are distributed between Clark Hall and Duffield Hall.

National Astronomy and Ionosphere Center. NAIC is the world's largest radio-radar telescope facility, operated by Cornell in Arecibo, Puerto Rico, focusing on radio and radar astronomical studies and investigations of the Earth's ionosphere.

National Institutes of Health/National Science Foundation Developmental Resource in Biophysical Imaging and Optoelectronics. This resource develops novel measurement and optical instrumentation for solving biophysical problems.

National Nanotechnology Infrastructure Network. NINN, a partnership of 13 university-based labs, provides access to infrastructure to enable the national science and engineering community to pursue research, education, and technology development dealing with nanotechnology.

National Science Digital Library. The NSDL project at Cornell, part of the NSF's national effort in developing resources and tools for digital libraries, hosts the production services for NSF's NSDL and designs and implements technical infrastructure.

Network for Earthquake Engineering Simulation (NEES). A system of nationwide experimental facilities linked by high-performance Internet for laboratory and computational simulation of structures under earthquake loads.

Northeast Regional Climate Center. This center monitors and reports on current climate conditions in the region.

Northeast Sun Grant Institute of Excellence. Partners in this initiative are involved in addressing energy needs and revitalizing rural communities with land-grant university research, education, and extension programs.

Power Systems Engineering Research Center. A National Science Foundation cooperative center between university and industry centered on addressing the challenges faced by the evolving electric power industry.

Program of Computer Graphics. This interdisciplinary research center operates one of the most advanced computer-graphics laboratories in the United States.

Program on Science, Technology, and Society. This cross-disciplinary unit sponsors courses and promotes research on the interaction of science, technology, and society.

Transportation Infrastructure Research Consortium. Cornell is the lead institution in this consortium of 12 institutions in New York State. It brings together the research expertise in a cross-disciplinary fashion to solve problems in cooperation with the staff of the New York State Department of Transportation, its principal sponsor.

The programs listed above are sponsored by College of Engineering units, and several are industry affiliated.

DEGREE PROGRAMS

Cornell programs in engineering and applied science lead to the degrees of bachelor of science (B.S.), master of engineering (M.Eng.), master of science (M.S.), and doctor of philosophy (Ph.D.).

General academic information concerning the B.S. degree is given below under "Undergraduate Study." The student pursues the degree in one of 13 majors. The majors are described under "Engineering Majors."

Many students stay a fifth year in the College of Engineering to pursue a professional degree, the master of engineering (M.Eng.) degree. Joint enrollment in the B.S. and M.Eng. degrees is possible for students in their last semester who lack only 1 to 8 credits for the B.S.

M.Eng. degrees are awarded in most of the major areas. In addition, the following M.Eng. degrees are awarded: aerospace engineering, biomedical engineering, electrical engineering, engineering mechanics, nuclear engineering, operations research and industrial engineering, and systems engineering. For full details on M.Eng. degrees, see "Master of Engineering Degree Programs."

Programs leading to the M.S. and Ph.D. degrees are administered by the Graduate School. They are described in the *Announcement of the Graduate School* and the special announcement *Graduate Study in Engineering and Applied Science*.

UNDERGRADUATE STUDY

Students in the College of Engineering spend most of their first two years of undergraduate studies in the Common Curriculum, which is administered by the College Curriculum Governing Board (CCGB) through the associate dean for undergraduate programs and Engineering Advising. At the end of their third semester, they affiliate with one of these majors.*

biological engineering (BE)†
 chemical engineering (ChemE)
 civil engineering (CE)
 computer science (CS)
 electrical and computer engineering (ECE)
 engineering physics (EP)
 environmental engineering (EnvE)
 independent major (IM)
 information science, systems, and technology (ISST)—with options in information science and management science
 materials science and engineering (MSE)
 mechanical engineering (ME)
 operations research and engineering (ORE)
 science of earth systems (SES)

Criteria for affiliation with the majors are described under "Affiliation with a Major." The majors are described under "Undergraduate Engineering Majors."

Most of the majors have a corresponding minor, in which the student can pursue a secondary interest. In addition, there are minors in applied mathematics, biomedical engineering, civil infrastructure, engineering

management, engineering statistics, game design, industrial systems and information technology, information science, and business. See the main section, "Engineering Minors."

*The majors biological engineering, chemical engineering, civil engineering, electrical and computer engineering, materials science and engineering, and mechanical engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

†Students may major in biological engineering through the College of Engineering or the College of Agriculture and Life Sciences (CALS). Students who do so through the College of Agriculture and Life Sciences are jointly enrolled with the College of Engineering for their last two years.

There is no undergraduate major in nuclear science and engineering. Students who intend to enter graduate programs in this area are encouraged to begin specialization at the undergraduate level. This may be done by choice of electives within the major (e.g., engineering physics, materials science and engineering, civil engineering, chemical engineering, and the independent major). Contact a faculty member in the graduate field of nuclear science and engineering who is most directly concerned with the curriculum, including K. B. Cady, D. A. Hammer, R. W. Kay, and V. O. Kostroun.

Graduation Requirements

To receive the bachelor of science degree, students must meet the requirements of the common curriculum (outlined below) as set forth by the College of Engineering, including the requirements of their chosen major, as established by the school or department that administers the major. (Further explanation of the revised common curriculum and major flow charts are provided in the 2009-2010 edition of the *Engineering Undergraduate Handbook*.)

Course Category	Credits
1. Mathematics (major-specific)	15-16
2. Physics (major-specific)	8-12
3. Chemistry (major-specific)	4-8
4. First-year writing seminar	6
5. Technical writing*	3
6. Computing	5
7. Introduction to engineering (ENGRI)	3
8. Two engineering distributions (ENGRD)	6-8
9. Liberal studies distribution (6 courses min.)	≥ 18
10. Advisor-approved electives	6
11. Major program	
a. Major-required courses	≥ 30
b. Major-approved electives	9
c. Courses outside the major	9
12. Two semesters of physical education in the freshman year and demonstration of proficiency in swimming (university requirement)	

From 124 to 134 credits are required for graduation, depending on the major (see "Engineering Majors").

*Technical-writing courses may simultaneously fulfill another requirement.

Mathematics

The normal program in mathematics includes MATH 1910, 1920, 2930 or 2940 (depending on the major), and a major-specific math course. At least C- must be attained in these courses; if not, the course must be repeated immediately before the next course in the sequence is taken. Failure to achieve at least C- the second time will result in withdrawal from the College of Engineering. Courses that are taken a second time do not yield additional credit toward a degree.

Physics

The normal program in physics includes PHYS 1112, 2213, and 2214 or the corresponding honors courses (PHYS 1116, 2217, and 2218). Engineering students must attain at least C- in each math prerequisite of a physics course before taking the physics course (e.g., C- in MATH 1910 before taking PHYS 1112 and C- in MATH 1920 before taking PHYS 2213). The following substitutions are allowed for PHYS 2214: CHEME, CE, CS, ISST, and SES majors: CHEM 2080. BE and EnvE majors: CHEM 1570 or 3570. ORE majors: CHEM 2080, CS 2800, or MATH 3040, 3110, or 3360.

Chemistry

CHEM 2090 is required. The content is the same as that of CHEM 2070, but Engineering students are expected to take 2090.

Typically, CHEM 2090 is taken during the freshman year, but students who wish to complete the physics program (PHYS 1112, 2213, and 2214) first may postpone CHEM 2090 until the sophomore year.

Students considering chemical engineering or a health-related career such as medicine must take CHEM 2090 in the fall of their freshman year and CHEM 2080 in the spring semester.

Computing

Students learn about computing using two programming languages by taking one of two sequences: (1) CS 1110 and CS 1132 or (2) CS 1112 (BE majors may take BEE 1510 instead) and CS 1130. The first course is taken in the first year. The second course, a 1-credit S-U course, is taken as soon as possible thereafter but no later than the fourth semester.

First-Year Writing Seminars

Each semester of their freshman year, students choose a first-year writing seminar from over 100 courses offered by over 30 different departments in the humanities, social sciences, and expressive arts. These courses offer the student practice in writing English prose. They also ensure beginning students the benefits of a small class.

Technical Writing

Students can fulfill the upper-level technical-writing requirement using one of the six alternatives below. See www.engineering.cornell.edu/ECP for more information.

1. ENGR 3500 or 3350
2. The Writing-Intensive Co-op—an opportunity to combine work and academics. Some co-op students do a significant amount of writing on the job; under certain circumstances, this writing will satisfy the technical-writing requirement.

3. An officially designated Writing-Intensive (W-I) engineering course:
 - ENGRD/AEP 2640
 - CHEME 4320
 - MSE 4030 and 4040 (both)
 - MSE 4050 and 4060 (both)
 - MAE 4272
 - BEE 4530
 - BEE 4730 with co-registration in BEE 4930
 - BEE 4890
4. ENGRD 3020, a 1-credit attachment to an engineering course that is not one of the officially designated W-I courses (see #3 above). An instructor may wish to extend the writing in their course for a given semester so that it will fulfill the technical-writing requirement. With the approval of the CCGB's Subcommittee on Technical Writing, the instructor may have students co-register in ENGRD 3020, which may be taken more than once with different courses by permission of the engineering instructor.
5. COMM 2600, 2630, or 3520, taught by the Department of Communication (in the College of Agriculture and Life Sciences).
6. Petition. Occasionally, a student will be doing a significant amount and variety of technical writing elsewhere in the College of Engineering. It may be appropriate to petition the CCGB's Subcommittee on Technical Writing for permission to use this forthcoming writing (not past writing) to meet the technical-writing requirement.

Introduction-to-Engineering Course

An introduction-to-engineering course (designated ENGRD) must be taken during the freshman year. This course introduces students to the engineering process and provides a substantive experience in an open-ended problem-solving context. See the Introduction-to-Engineering course listing for current course offerings.

Engineering Distribution

Two engineering distribution (ENGRD) courses (6–8 credits) must be selected from two different categories listed below. A student may use any one of the possible substitutions described.

1. *Scientific computing*
 - ENGRD 2110 Object-Oriented Programming and Data Structures
 - ENGRD 3200 Engineering Computation
 - ENGRD 3510 Numerical Methods in Computational Molecular Biology
 - ENGRD 3220 Introduction to Scientific Computation
2. *Materials science*
 - ENGRD 2610 Introduction to Mechanical Properties of Materials: From Nanodevices to Superstructures
 - ENGRD 2620 Electronic Materials for the Information Age
3. *Mechanics*
 - ENGRD 2020 Mechanics of Solids
 - ENGRD 2030 Dynamics

- Majors in Engineering Physics may substitute AEP 3330 for ENGRD 2030.
- 4. *Probability and statistics*
 - ENGRD 2700 Basic Engineering Probability and Statistics
 - Majors in Electrical and Computer Engineering may substitute ECE 3100 for ENGRD 2700. Majors in Engineering Physics may substitute ECE 3100 or MATH 4710 for ENGRD 2700. Majors in Civil Engineering, Biological Engineering, and Environmental Engineering may substitute CEE 3040 for ENGRD 2700.
- 5. *Electrical sciences*
 - ENGRD 2100 Introduction to Circuits for Electrical and Computer Engineers
 - ENGRD 2300 Introduction to Digital Logic Design
 - ENGRD 2640 Computer-Instrumentation Design
- 6. *Thermodynamics and energy balances*
 - ENGRD 2190 Mass and Energy Balances
 - ENGRD 2210 Thermodynamics
- 7. *Earth and life sciences*
 - ENGRD 2010 Introduction to the Physics and Chemistry of the Earth
 - ENGRD 2510 Engineering for a Sustainable Society
 - ENGRD 2600 Principles of Biological Engineering
- 8. *Biology and chemistry*
 - ENGRD 2520/AEP 2520 The Physics of Life
 - BIOG 1101 and 1103 Biological Sciences, Lec and Lab
 - BIOG 1105 Introductory Biology
 - BIOG 1107 General Biology (summer only)
 - CHEM 3890 Physical Chemistry I

Some majors require a specific engineering distribution course as a prerequisite for the upper-class course sequence. These requirements are as follows:

- Biological Engineering: ENGRD 2020
- Chemical Engineering: ENGRD 2190
- Civil Engineering: ENGRD 2020
- Computer Science: ENGRD 2110
- Electrical and Computer Engineering: ENGRD 2300
- Environmental Engineering: ENGRD 2020
- Geological Sciences: ENGRD 2010
- Information Science, Systems, and Technology: ENGRD 2700
- Materials Science and Engineering: ENGRD 2610 or ENGRD 2620
- Mechanical Engineering: ENGRD 2020
- Operations Research and Engineering: ENGRD 2700

Some majors require additional distribution courses after affiliation.

Liberal Studies Distribution

Global and diverse societies require that engineers have an awareness of historical patterns, an appreciation for different cultures, professional ethics, the ability to

work in multifaceted groups, and superior communications skills. Cornell has a rich curriculum in the humanities, arts, and social sciences, enabling every engineering student to obtain a truly liberal education. At least six courses (totaling at least 18 credits) are required, and they should be chosen with as much care and foresight as courses from technical areas.

- The six courses must be chosen from at least three of the following six groups.
- At least two of the six courses must be at the 2000 level or higher.

Utilize the current *Courses of Study* as the master list of approved Liberal Studies courses. Additional approved courses and unacceptable courses can be viewed at www.engineering.cornell.edu/programs/undergraduate-education/degree-requirements/liberal-studies.cfm.

Group 1. Cultural Analysis (CA)

Courses in this area study human life in particular cultural contexts through interpretive analysis of individual behavior, discourse, and social practice. Topics include belief systems (science, medicine, religion), expressive arts and symbolic behavior (visual arts, performance, poetry, myth, narrative, ritual), identity (nationality, race, ethnicity, gender, sexuality), social groups and institutions (family, market, community), and power and politics (states, colonialism, inequality).

Group 2. Historical Analysis (HA)

Courses in this group interpret continuities and changes—political, social, economic, diplomatic, religious, intellectual, artistic, and scientific—through time. The focus may be on groups of people, dominant or subaltern, a specific country or region, an event, a process, or a time period.

Group 3. Literature and the Arts (LA)

Offerings in this area explore literature and the arts in two different but related ways. Some courses focus on the critical study of artworks and on their history, aesthetics, and theory. These courses develop skills of reading, observing, and hearing and encourage reflection on such experiences; many investigate the interplay among individual achievement, artistic tradition, and historical context. Other courses are devoted to the production and performance of artworks (in creative writing, performing arts, and media such as film and video). These courses emphasize the interaction among technical mastery, cognitive knowledge, and creative imagination.

Group 4. Knowledge, Cognition, and Moral Reasoning (KCM)

Offerings in this area investigate the bases of human knowledge in its broadest sense, ranging from cognitive faculties shared by humans and animals such as perception, to abstract reasoning, to the ability to form and justify moral judgments. Courses investigating the sources, structure, and limits of cognition may use the methodologies of science, cognitive psychology, linguistics, or philosophy. Courses focusing on moral reasoning explore ways of reflecting on ethical questions that concern the nature of justice, the good life, or human values in general.

Group 5. Social and Behavioral Analysis (SBA)

Courses in this area examine human life in its social context through the use of social-scientific methods, often including hypothesis testing, scientific sampling techniques, and statistical analysis. Topics studied range from the thoughts, feelings, beliefs, and attitudes of individuals to interpersonal relations between individuals (e.g., in friendship, love, conflict) to larger social organizations (e.g., the family, society, religious or educational or civic institutions, the economy, government) to the relationships and conflicts among groups or individuals (e.g., discrimination, inequality, prejudice, stigmas, conflict resolution).

Group 6. Foreign Languages (not literature courses)

Courses in this area teach language skills, inclusive of reading, writing, listening, and spoken non-English languages, at beginning to advanced levels.

Electives

- **Advisor-approved electives:** 6 credits required (approved by the academic advisor). Because these courses should help develop and broaden the skills of the engineer, advisors generally accept the following as approved electives:
 1. One introduction-to-engineering course (ENGR1)
 2. Engineering distribution courses
 3. Courses stressing written or oral communication
 4. Upper-level engineering courses
 5. Advanced courses in mathematics
 6. Rigorous courses in the biological and physical sciences
 7. Courses in business, economics, or language (when they serve the student's educational and academic objectives)
 8. Courses that expand the major or another part of the curriculum.
 9. Up to 6 credits of advisor-approved electives may come from ROTC courses at the 3000 level or higher.
- **Major-approved electives:** 9 credits (approved by the major and faculty advisors in the major). Refer to the major curricula for descriptions of courses in this category.
- **Outside-the-major electives:** 9 credits of courses outside the major to ensure breadth of engineering studies

Social Issues of Technology

It is important for engineers to realize the social and ethical implications of their work. Consequently, in selecting their liberal studies distribution courses and approved electives, students are urged to consider courses listed in the "Science and Technology Studies" undergraduate area of concentration (see "Interdisciplinary Centers and Programs"). These courses may provide students with important perspectives on their studies and their future careers.

Engineering Advising

Entering first-year students are assigned a faculty advisor (who may or may not be in their intended major), who remains their advisor until affiliation with a major (normally

during the fourth semester). The students are also under the administration of Engineering Advising in 167 Olin Hall, which implements the academic policies of the College Curriculum Governing Board. Engineering Advising serves as the primary resource center for undergraduate students in the college, offering general and academic advising. Other student services offices located in Olin Hall are Engineering Learning Initiatives and Diversity Programs in Engineering (DPE), which are primary resources for academic advising, support, tutoring, and networking opportunities.

First-Year Requirements

During the first year, engineering students are expected to complete (or receive credit for) the following core requirements:

- MATH 1910 and 1920
- Two of: CHEM 2090, 2080, PHYS 1112, 2213, 2214* (or the Honors equivalent)
- One of: CS 111X
- Two first-year writing seminars
- One introduction to engineering (ENGR1) course
- Two physical education courses

*Students interested in chemical engineering, pre-med, or other health-related careers should enroll in the CHEM 2090-2080 sequence during their first year.

Affiliation with a Major

Students must apply for affiliation with a major during the first semester of their sophomore year, although earlier affiliation may be granted at the discretion of the major. This is done by visiting the undergraduate major office and completing the application for major affiliation form. To affiliate, students must (1) make good progress toward completing required courses in the common curriculum, (2) have a GPA ≥ 2.0 , and (3) have satisfied the major's course and grade requirements as specified below:

(Majors may impose alternative affiliation requirements for students applying for affiliation later than the first semester of the sophomore year.)

Major	Courses and Minimum Grade Requirements
Biological Engineering	GPA ≥ 2.5 and at most one grade below C- in math, science, and engineering courses. Completion of ENGRD 2600 (or 2510) and Intro Biology Sequence by end of the sophomore year. (Also applies to transfer students.)
Chemical Engineering	At most one grade below C- in chemistry, math, physics, and chemical engineering courses. GPA ≥ 2.2 in math, science, and engineering courses.
Civil Engineering	GPA ≥ 2.0 in all engineering and science courses. At least C in ENGRD 2020 (or ENGRD 2510, for students who do not take ENGRD 2020 before affiliation).

Computer Science At least C in all completed CS and math courses. GPA ≥ 2.5 in CS 2110 and 2800. GPA ≥ 2.5 in MATH 1920 and CS 2800. Visit the CS undergraduate web site for alternative affiliation criteria.

Electrical and Computer Engineering At least C+ in MATH 2930, PHYS 2213, and one of ECE/ENGRD 2100, ECE 2200, or ECE/ENGRD 2300. Must have a GPA ≥ 2.5 in (if completed): MATH 1920, 2930, 2940, PHYS 2213, ENGRD 2110, ECE/ENGRD 2300, ECE/ENGRD 2100, ECE 2200.

Engineering Physics At least B- in all required math and physics courses.

Environmental Engineering GPA ≥ 2.0 in all engineering and science courses. At least C- in BEE/ENGRD 2510.

Independent Major GPA ≥ 2.0 .

Information Science Systems, and Technology At least C in two of MATH 2940, CS 2110, and ENGRD 2700. Courses must be taken for a letter grade. GPA ≥ 2.3 in completed engineering math, engineering distribution, and ISST major courses, which must be taken at Cornell. For a repeated course, the most recent grade will be used.

Materials Science and Engineering A cumulative GPA ≥ 2.0 in the required Math, Physics, and Chemistry courses and at least C in ENGRD 2610 or 2620. Alternatively, at least B- in MATH 2930, PHYS 2213, CHEM 2090, and ENGRD 2610 or 2620.

Mechanical Engineering At least C- in ENGRD 2020, ENGRD 2210*, and all completed required math, science, and computer science courses. GPA ≥ 2.5 in MATH 2930, PHYS 2213, ENGRD 2020, and ENGRD 2210. *If ENGRD 2210 was taken.

Operations Research and Engineering At least C in each of ENGRD 2700 and MATH 2940. GPA ≥ 2.2 in math, science, and engineering courses (both overall and in the term immediately before affiliation). At least C- in all ORIE courses completed thus far. Good academic standing in the College of Engineering.

Science of Earth Systems Good academic standing in the College of Engineering.

Students must be affiliated or conditionally affiliated with a major by the end of their fourth semester or they will be withdrawn

from the College of Engineering, unless allowed to participate in a terminal semester.

SPECIAL PROGRAMS

Dual-Degree Program

The dual-degree program, intended for superior students, allows both a bachelor of science and either a bachelor of arts (B.A.) or bachelor of fine arts (B.F.A.) degree to be earned in about five years. Students registered in the College of Engineering, the College of Arts and Sciences, or the College of Architecture, Art, and Planning may apply and, after acceptance of their application, begin the dual-degree program in their second or third year. For information, contact the appropriate coordinators of dual-degree programs at 55 Goldwin Smith Hall (for Arts and Sciences), B-1 West Sibley Hall (for Architecture, Art, and Planning), and Engineering Advising, 167 Olin Hall.

Double Major in Engineering

The double-major option, which makes it possible to develop expertise in two allied engineering majors, generally requires at least one semester beyond the usual four years. Students affiliate with one major following normal procedures and then petition to enter a second major before the end of their junior year. All requirements of both majors must be satisfied. Further information is available from Engineering Advising, 167 Olin Hall, and the individual major offices.

Independent Major

Students whose educational objectives cannot be met by one of the regular majors may affiliate with the independent major. Often, the desired curriculum is in an interdisciplinary area.

This major consists of a primary area (≥ 32 credits), which may be any subject area offered by a school or department of the college, and an educationally related secondary area (≥ 16 credits), which may be in a second engineering subject area or in a logically connected nonengineering area. The combination must form an engineering education in scope and substance and should include engineering design and synthesis as well as engineering sciences. See the discussion of this major in "Undergraduate Engineering Majors."

Engineering Minors

Students may pursue minors in any department in any college that offers them, subject to limitations placed by the department offering the minor or by the students' major. Completed minors will appear on the student's transcript. Not all departments offer minors. Consult the appropriate section in *Courses of Study* or contact the appropriate department for information on minors offered and how to pursue a minor.

Most engineering majors have a corresponding minor, requiring six courses (18 credits), in which the student can pursue a secondary interest. In addition, there are minors in applied mathematics, biomedical engineering, civil infrastructure, engineering management, engineering statistics, game design, industrial systems and information technology,

information science, and business. See "Engineering Minors."

Engineering Communications Program

424 Hollister Hall, 255-8558, www.engineering.cornell.edu/ECP

The Engineering Communications Program (ECP) provides instruction in technical writing, oral presentation, and the use of graphics in both. The ECP is a recipient of the Engineering Dean's Prize in Excellence and Innovation in Teaching.

ECP courses give students experience with the difficult task of explaining technical information to audiences that have various levels of technical expertise. Students improve their writing style, become more comfortable with and effective at oral presentation, use standard forms and formats for presenting technical information, perform library and Internet research on engineering topics, and study real engineering situations in which ethics may have been breached.

Enrollment in ECP courses is typically 20 students per section; like writing seminars elsewhere at Cornell, those taught by the ECP are discussion classes. Students' work receives abundant written comments, and conferences are frequent.

ECP members are available to consult with the faculty teaching writing-intensive technical courses and anyone else interested in including writing in their courses. They oversee the communications component of the Writing-Intensive Co-op and occasionally give talks to alumni and student groups.

Diversity Programs in Engineering

146 Olin Hall, 255-6403

The Diversity Programs in Engineering (DPE) office operates programs at the undergraduate, graduate, and faculty levels to facilitate the outreach, recruitment, retention, and overall success of underrepresented minorities, women, and other underrepresented groups in Engineering. DPE serves as a resource center for academic support, career placement, graduate school preparation, and overall student success.

The office participates in a university-wide pre-freshman summer program (Engineering Summer Scholars Program) for admitted students, coordinates two summer program initiatives for high school students, CURIE (www.engineering.cornell.edu/curie) and CATALYST (www.engineering.cornell.edu/catalyst), and also provides specialized instruction, in collaboration with Engineering Advising and Engineering Learning Initiatives, each semester in subjects such as math, computer science, and English composition.

The DPE office sponsors networking events throughout the academic year that allow company representatives from all over the United States to meet students from diverse populations. Summer internships and permanent jobs frequently result from these events.

In addition, the DPE office coordinates various trips, recreational activities, seminars, lectures, and workshops on a wide range of topics that are relevant to academic and extracurricular life in the university setting.

Engineering Learning Initiatives

167 Olin Hall, 255-9622, www.engineering.cornell.edu/learning

The office of Engineering Learning Initiatives offers programs designed to enhance the undergraduate academic experience through peer education, collaborative learning, research opportunities, and leadership development.

Academic Excellence Workshops (AEWs) offered through Engineering Learning Initiatives are taken in conjunction with core engineering courses in math, computer science, and chemistry. The 1-credit AEWs are weekly two-hour collaborative learning sessions. Designed to enhance student understanding, they feature peer-facilitated group work on problems at or above the level of course material.

Undergraduate Research Grants offered through Engineering Learning Initiatives provide opportunities for students to obtain hands-on research experience with a faculty mentor. Students and faculty may apply for funding to cover student stipend and expense costs for the fall, spring, and summer terms.

Tutors-on-Call, through Engineering Learning Initiatives, offers one-on-one peer tutoring free of charge for engineering students in many first- and second-year core courses, including math, chemistry, physics, computer science, and distribution courses.

LeaderShape, offered through Engineering Learning Initiatives, provides opportunities for our students to engage in the dynamic process of personal discovery and leadership development at a weeklong retreat held in May of each year.

Engineering Cooperative Education and Career Services

201 Carpenter Hall, 255-5006, www.engineering.cornell.edu/careerservices

This office assists engineering students (freshmen through Ph.D.) on issues related to career development and the job search through individual advising and group seminars. It also administers the Engineering Cooperative Education Program. Each year, more than 200 national employers visit the office to recruit technical interns and graduates; additional job opportunities are posted on Cornell's electronic job posting service. Both undergraduate and graduate students can use these resources to pursue permanent, summer, or co-op employment; however, students seeking co-op opportunities must meet specific requirements.

The Engineering Cooperative Education Program (Co-op) provides an opportunity for students to gain practical experience in engineering-related organizations before they graduate. By supplementing course work with carefully monitored, paid positions, Co-op students can explore their own interests and acquire a better understanding of engineering as a profession—and still graduate in four years.

To be eligible, a student must have been enrolled in the College of Engineering an equivalent of five semesters before starting the first work term. (Exceptions may be made for transfer students and others pursuing an accelerated curriculum.) Students majoring in computer science or biological engineering,

but not registered in the College of Engineering, are also eligible. In most cases, a GPA ≥ 2.7 is required. Applicants interview with participating employers in February of the sophomore year. Those who receive offers and join the program usually complete their fifth-semester course work on campus during the summer after sophomore year and begin the first Co-op work term the following fall. They complete the sixth semester on campus with their classmates and then return to their Co-op employer (but not necessarily to the same department or location) the following summer to complete a second work term. Students then spend the senior year on campus, graduating on schedule with their class. Students who have flexible course curriculums may prefer to complete one 28-week spring/summer or summer/fall Co-op work term during the junior year.

International Programs

An international perspective, sensitivity to other cultures, and the ability to read and speak a second language are increasingly important for today's engineers. The College of Engineering encourages students to study or work abroad during their undergraduate years. Currently, the college has study abroad agreements with École Centrale Paris, France; Cantabria, Spain; and the Hong Kong University of Science and Technology, and is also working with IIT Kanpur, India, and the National University of Singapore. The college is working to facilitate study abroad in Dresden, Germany; and Guadalajara, Mexico. Students who plan to study abroad apply through Cornell Abroad; see the Cornell Abroad program description in the introductory section of *Courses of Study*. Visit www.engineering.cornell.edu/studyabroad and Engineering Advising, 167 Olin Hall, for the latest information. In addition, the college is working on developing international Co-op and internship work experiences. For information, visit the Engineering Cooperative Education and Career Services Office, 201 Carpenter Hall.

Cooperative Program with the Johnson Graduate School of Management

Undergraduates may be interested in a cooperative program at Cornell that leads to both master of engineering and master of business administration (M.B.A.) degrees. See "Master of Engineering Degrees" for details.

Lester Knight Scholarship Program

The Lester Knight Scholarship Program is designed to assist and encourage Cornell Engineering students and alumni interested in combining their engineering education with a business degree. See www.engineering.cornell.edu/Knightscholarships for details.

ACADEMIC PROCEDURES AND POLICIES

Advanced Placement Credit

The College of Engineering awards a significant amount of advanced placement (AP) credit to entering first-year students who demonstrate proficiency in the subject areas of introductory courses. Students can earn AP

credit by receiving qualifying scores on any of the following:

1. Advanced placement examinations given and scored by the College Entrance Examination Board (CEEB);
2. General Certificate of Education (GCE) Advanced ("A") Level Examinations;
3. International Baccalaureate (IB) Higher Level Examinations; or
4. Cornell Advanced Standing Examinations (CASE), given during orientation week before the beginning of fall-semester classes.

Advanced placement credit is intended to permit students to develop more challenging and stimulating programs of study. Students who receive AP credit for an introductory course may use it in three different ways. They may:

1. enroll in a more advanced course in the same subject right away.
2. substitute an elective course from a different area.
3. enroll in fewer courses, using the AP credit to fulfill basic requirements.

Acceptable Subjects and Scores for CEEB or CASE AP Exams

The most common subjects for which AP credit is awarded in the College of Engineering, and the scores needed on qualifying tests, are listed below. AP credit is awarded only for courses that meet engineering curriculum requirements.

Mathematics: MATH 1910, 1920 are required.

First-semester math (MATH 1910). AP credit may be earned by:

- a score of 4 or 5 on the CEEB BC exam, or
- a passing score on the CASE exam for first-semester math.

First-year math (through MATH 1920). AP credit may be earned by:

- a passing score on the CASE exam for first-year math.

Physics: PHYS 1112 and 2213 are required.

PHYS 1112. AP credit may be earned by:

- a score of 4 or 5 on the mechanics portion of the CEEB C exam, or
- a score of 5 on the CEEB B exam with successful completion of a high school-level calculus course, or
- a passing score on the CASE exam for PHYS 1112.

Note: MATH 2930 is a prerequisite for PHYS 2214.

PHYS 2213. AP credit may be earned by a score of 5 on the Electricity and Magnetism portion of the AP C exam.

PHYS 1116, 2217, and 2218 (honors sequence). This sequence is designed for students with strong experience in physics and calculus, e.g., a 5 on one or both Physics C AP tests and the equivalent of at least one semester of university calculus. Students interested in PHYS 2217 or 2218 are strongly advised to start with PHYS 1116. Even for a student with a 5 on both Physics C AP tests, 1116 will not be boring. Students may not

simultaneously receive credit for PHYS 1116 and AP credit for PHYS 1112, or credit for PHYS 2217 and AP credit for PHYS 2213. For advice or more information, contact the departmental representative at 255-6016.

Chemistry: CHEM 2090 is required.

CHEM 2090. AP credits may be earned by:

- a score of 5 on the CEEB AP exam, or
- a passing score on the CASE exam for chemistry.

Note: Students who obtain AP credit for CHEM 2090 and who are considering a major in chemical engineering or materials science and engineering should consider enrolling in CHEM 2150. Those who are offered AP credit for CHEM 2090 and then elect to take CHEM 2150 will also receive academic credit for CHEM 2090. Students may want to discuss this option with their faculty advisor.

Computing: CS 1110 or CS 1113 or CS 1112 or CS 1114, together with CS 1132 or CS 1130, are required. AP credit may be earned for CS 1110 by:

- a score of 5 on the CEEB A or a score of 4 or 5 on the AB exam, or
- a passing score on the CASE exam for CS 1110.

Biology: Biology is not required as part of the core curriculum, although it is a popular elective, especially for students who intend to pursue health-related careers. AP credit may be earned as follows:

- 8 credits will be offered to students who receive a 5 on the CEEB AP exam;
- 4 credits will be offered to students who receive a 4 on the CEEB AP.

Those who want to study more biology should contact the Office of Undergraduate Biology, 200 Stimson Hall, to discuss proper placement.

First-year writing seminar: Two first-year writing seminars are required.

- AP credit for one first-year writing seminar may be earned by a score of 5 on either of the CEEB AP English exams.

Students who earn a score of 4 on the AP English Literature and Composition exam or the AP English Language and Composition exam will be offered 3 credits, which may be applied toward the Literature and Arts (LA) category of the Liberal Studies distribution requirement.

Liberal studies distribution: Six courses beyond two first-year writing seminars are required. Students may earn AP credit toward the liberal studies distribution by taking CEEB AP tests. AP credit earned in the liberal studies distribution cannot be used to fulfill the "upper-level" liberal studies requirements.

Languages: Students may earn AP credit for competence in a foreign language by taking the CEEB AP test or by taking the CASE. Those who score 4 or 5 on the CEEB AP test in French, German, Italian, and Spanish are entitled to 3 credits. To qualify for the CASE exam (in any language), the student must score at least 65 on a college placement test (taken either in high school or at Cornell during Orientation Week). A passing score on the CASE entitles the student to 3 credits. Language credit, earned via AP or CASE, may be used to satisfy part of the foreign language

category of the liberal studies distribution or may meet an approved elective requirement, contingent on discussions with the faculty advisor.

Advanced Placement and Credit for International Credentials

Students who have successfully completed either a General Certificate of Education (GCE) Advanced ("A") Level Examination or an International Baccalaureate (IB) Higher Level Examination may be eligible for advanced placement credit in the College of Engineering as follows:

General Certificate of Education Advanced Level Examination (GCE "A")

Hong Kong Advanced Level examinations and the joint examination for the Higher School Certificate and Advanced Level Certificate of Education in Malaysia and Singapore—principal passes only—are considered equivalent in standard to GCE "A" Levels.

Subject	Marks	Credit
Biology	A or B	8 credits
Chemistry	A	8 credits (CHEM 2090 and 2080)
	B	4 credits (CHEM 2090)
Mathematics or Pure Mathematics	A, B, or C	4 credits (MATH 1910)
Physics	A or B	4 credits for PHYS 1112; 4 additional credits for PHYS 2213 are granted to a combination of grades of A or B and a minimum of 4 AP (or advanced standing) credits in mathematics.

International Baccalaureate (IB) Higher Level Examination

Subject	Marks	Credit
Biology	7	8 credits
	6	6 credits
Chemistry	6 or 7	4 credits (CHEM 2090)
Computer Science	6 or 7	4 credits (CS 1110)
Physics	6 or 7	4 credits (PHYS 1112)

Mathematics: No credit is given for the IB exam; students are encouraged to take the Engineering Mathematics Advanced Standing exam during orientation.

Note: Advanced placement credit based on GCE or IB results may also be awarded for courses that satisfy the liberal studies requirement in the College of Engineering. In such cases, the College of Engineering follows the AP guidelines found earlier in this publication under "General Information."

General Policies for Advanced Placement

The general policies in the College of Engineering governing awards of AP credit are as follows:

1. AP credit will not be offered in any subject area without a documented examination.
2. All AP examinations are normally taken and scored before fall-semester classes begin. Students who take CEEB AP tests in high school should have an official report of their scores sent directly to Cornell as soon as possible. Students who have completed either GCE "A" Level or IB Higher Level Examinations must present the original or a certified copy of their examination certificate to Engineering Advising, 167 Olin Hall. Those who wish to take CASE examinations should do so during Orientation Week.

A more detailed description of the college's policies concerning advanced placement credit and its use in developing undergraduate programs is available online at www.engineering.cornell.edu/student-services/academic-advising/academic-information/ap-credit/index.cfm.

General Policies for Transfer Credit

Undergraduate students who have completed courses at recognized and accredited colleges may, under certain conditions, have credits for such courses transferred to Cornell. Such courses must represent academic work in excess of that required for the secondary school diploma and must be documented as such in writing by the secondary institution. Courses deemed acceptable for transfer credit must be equivalent in scope and rigor to courses at Cornell. Transfer credit will not be awarded for courses taken during a semester in which the student is enrolled at Cornell.

- To apply for transfer credit, submit a transfer credit form (one form for each request), accompanied by a course description. (Forms are available from Engineering Advising or the Registrar's office and should be submitted before enrollment in the course to be transferred.) An official transcript from the offering institution (bearing the institutional seal and Registrar's signature) must be sent to the Engineering Registrar's office before official transfer credit will be awarded.
- Applications for transfer credit to satisfy requirements in math, science, engineering courses, or first-year writing seminars require approval from the department offering an equivalent course at Cornell. The department may require course materials, textbooks used, etc., in addition to the course description before approving the course.
- Departmental approval is not required for transfer credit that satisfies liberal studies distribution requirements. The course will be reviewed for approval by a representative of the Committee on Academic Standards, Petitions, and Credit (ASPAC) in Engineering Advising.
- Cornell does not award credit for courses in which a student has earned a grade less than C; schools and departments may stipulate a higher minimum grade.
- College courses completed under the auspices of cooperative college and high school programs will be considered for advanced placement credit only if students demonstrate academic

proficiency by taking the appropriate AP or Cornell departmental placement examination (CASE), as described in the "Advanced Credit" section.

- Following matriculation, students may apply up to 18 credits of transfer and/or Cornell extramural credit toward B.S. degree requirements.
- At most 72 total transfer credits (taken both before and after matriculation) may be used to meet graduation requirements.
- Summer session courses taken at Cornell are not considered transfer credit.

A more detailed description of the college's regulations governing transfer credit is available online at www.engineering.cornell.edu/student-services/academic-advising/index.cfm.

Transfer Credit for Transfer Students

Transfer students may transfer up to 36 credits for each year spent in full-time study at another institution, provided that the courses are acceptable for meeting graduation requirements. Transfer credit awards are determined by the majors/departments. Students must complete the transfer credit award process by the end of their first semester at Cornell, or their registration will be blocked for the next semester until the process is completed.

Academic Standing

Full-time students are expected to remain in good academic standing. The criteria for good standing change somewhat as a student progresses through the four years of the engineering curriculum. At all times, the student must be making adequate progress toward a degree, but what this means depends on the major.

Engineering students not yet affiliated with a major must meet the following standards at the end of each semester to be considered in good academic standing. Failure to meet these standards will result in a review by the Committee on Academic Standards, Petitions, and Credit (ASPAC), and the actions of warning, stern warning, required leave of absence, or withdrawal from the College of Engineering may be taken.

1. At least 12 credits passed, including *at least* two courses from math, science, and/or engineering (phys. ed. courses and courses below the 1100 level do not count)
2. At least C– in the math course
3. Semester GPA \geq 2.0
4. No F, U, or INC grades

Academic Progress

The total number of credits required for graduation range from 124 to 134, depending on the major. Therefore, an average semester credit load ranges from 15 to 17 credits.

Because math is pivotal to the study and practice of engineering, students must earn at least C– in their four required math courses. If at least C– is not attained, the course must be repeated immediately. Failure to achieve at least C– the second time will generally result in withdrawal from the College of Engineering. Physics and advanced math courses often have math prerequisites, and having to repeat the prerequisite course may

delay progress in the physics and math curricula. Students are expected to continue the core engineering math courses each semester until completed.

Dean's List

Dean's List citations are presented each semester to engineering students who have exemplary academic records. The dean of the college determines the criteria for this honor. For 2009-2010, the requirement is a semester GPA ≥ 3.5 (without rounding); no failing, unsatisfactory, missing, or incomplete grades (even in physical education); and at least 12 letter-grade credits (not S-U). Students may earn Dean's List status retroactively if they meet these criteria after making up incomplete grades. Students who earn Dean's List status receive certificates from the Engineering Registrar's office, and the honor is noted on the transcript.

Graduating with Distinction and Honors

Graduating with Distinction

Meritorious students graduating with a B.S. degree from the College of Engineering may also be designated *cum laude*, *magna cum laude*, or *summa cum laude*.

- Cum laude will be awarded to engineering students with a GPA ≥ 3.5 . Cum laude will also be awarded to engineering students who received a semester GPA ≥ 3.5 in each of the last four semesters at Cornell; in each of these semesters, at least 12 letter-graded credits must be taken with no failing, unsatisfactory, missing, or incomplete grades. If the student is an engineering co-op student, then the engineering co-op summer term will count as one of the last four. Students who were approved for prorated tuition in their final semester will be awarded cum laude if they received a semester GPA ≥ 3.5 in their last semester and meet the conditions above in the prior four semesters.
- Magna cum laude will be awarded to engineering students with a GPA ≥ 3.75 (based on all credits taken at Cornell).
- Summa cum laude will be awarded to engineering students with a GPA ≥ 4.0 (based on all credits taken at Cornell).

Note: All GPA calculations are minimums and are not rounded.

Major Honors Program

To be eligible to enter a major honors program, a student must be on track to graduate with distinction. A student must be in the program for at least two semesters before graduation. If the student's major has an approved honors program and the requirements for (1) distinction, (2) Bachelor of Science degree, and (3) major honors program are fulfilled, the faculty of the major may recommend that the student graduate with the additional diploma and transcript notation of "With Honors."

S-U Grades

Many courses may be taken either for a letter grade or for an S-U (satisfactory or unsatisfactory) grade designation. Under the S-U option, students earning the letter grade

equivalent of at least C- in a course will receive a grade of S; those earning less than C- receive U. A course in which a U grade is received does not count toward graduation requirements.

Engineering students may choose to receive an S-U grade option under the following conditions:

- The course in question must be offered with an S-U option.
- The student must previously have completed at least one full semester of study at Cornell.
- The proposed S-U course must count as either a liberal studies distribution or an advisor-approved elective in the engineering curriculum.
- Students may enroll S-U in only one course each semester in which the choice between letter grade and S-U is an option. (Additional courses offered "S-U grades only" may be taken in the same semester as the elected S-U course.)

The choice of grading option for any course is made initially during the pre-enrollment period and may be changed until the end of the third week of classes. After this deadline, the grading option may not be changed, nor will a student be permitted to add a course in which he or she was previously enrolled (in the current semester) under a different grade option. (Grading options may be changed online for most courses. A properly completed add/drop form must be used to change a grade option for a permission-only course.)

Residence Requirements

Candidates for an undergraduate degree in engineering must spend at least four semesters or an equivalent period of instruction as full-time students at Cornell, including at least three semesters affiliated with an engineering major.

Students on a voluntary leave of absence may register for courses extramurally only with the approval of their major (or the college, for unaffiliated students). No more than 18 credits earned through extramural study or acquired as transfer credit (or a combination thereof) after matriculation may be used to satisfy the requirements for the B.S. degree in engineering. Students may not complete their last semester extramurally.

Degree candidates may spend periods of time studying away from the Cornell campus with appropriate authorization. Information on programs sponsored by other universities and on procedures for direct enrollment in foreign universities is available at the Cornell Abroad office, 474 Uris Hall. Programs should be planned in consultation with the staff of Engineering Advising, who can provide information on credit-evaluation policies and assist in the petitioning process.

Transferring within Cornell

It is not uncommon for students to change their academic or career goals after matriculation in one college and decide that their needs would be better met in another college at Cornell. While transfer between colleges is not guaranteed, efforts are made to assist students in this situation.

The Internal Transfer Division office is responsible for assisting students with the transfer process. Students who wish to transfer out of the College of Engineering to another college at Cornell should consult initially with Engineering Advising.

Students who wish to transfer into the College of Engineering can apply at Engineering Advising, 167 Olin Hall. It is preferred that students apply in the semester in which they are completing affiliation criteria for the desired major. Transfer students who would enter the college must be accepted by a major as part of the admission process.

Students who wish to transfer into engineering should take courses in math, chemistry, computer science, physics, and engineering that conform to the requirements of the Common Curriculum. Students should discuss their eligibility with an advisor in Engineering Advising, 167 Olin Hall.

Leave of Absence

A leave of absence may be voluntary, health-related, or required. A description of each follows:

Voluntary leave: Students sometimes find it necessary to suspend their studies. To do this, they must petition for a leave of absence for a specified period of time and receive written approval.

Affiliated students request leave through their majors. Unaffiliated students request leave through Engineering Advising; the first step is an interview to establish conditions for the leave and subsequent return. Those who take a leave before affiliating with a major and while not in good standing may be given a "conditional leave." This requires them to meet specific conditions, established at the time the leave is granted, before they will be reinstated.

A leave of absence is granted for at least six months and not more than two years. A leave of absence granted during a semester goes into effect on the day it is requested. If a leave is requested after the 12th week of a semester, the courses in which the student was registered at the time of the request are treated as having been dropped (i.e., a "W" will appear on the transcript for each course). Students who owe money to the university are ineligible for a leave of absence. Courses taken during a leave to satisfy Cornell degree requirements must be approved *in advance* through a formal transfer petition. (See previous section, "Transfer Credit," for details.)

Students who intend to take a leave of absence should check with the Office of Financial Aid and Student Employment to discuss financial implications; this is especially true for those who have educational loans. Medical insurance eligibility may also be affected.

To return after a leave of absence, the conditions established when the leave was granted must be satisfied, and the college must be notified in writing at least six weeks before the beginning of the semester in which the student plans to return.

Health leave: Health leaves are granted by the college only upon recommendation by a physician or therapist from Gannett Health Center. Although circumstances may vary, such leaves are generally granted for at least one full academic year with the understanding that the student may return at the beginning

of any semester after the medical condition in question has been corrected. Students must satisfy the Gannett Health Center that the condition has been corrected before they may return. The student's academic standing will also be subject to review both at the time the leave is granted and upon the student's return.

Required leave: A required leave of absence is imposed in cases in which the academic progress of a student is so poor that continuing into the next semester does not appear prudent. An example of this might be failure in key engineering courses in a semester. Unless the student is ahead in the curriculum, returning later to repeat the semester makes better academic sense than continuing without the necessary background. In many cases, the leave is dictated by courses that are offered only in the fall or spring semester. Leaves are given when the probability of success is increased substantially by deferring the student's return by one semester (or, in unusual circumstances, one year). Required leaves take precedence over voluntary leaves.

Rejoining the College

Students wishing to rejoin the college who have not yet affiliated with a major should request permission to rejoin in a letter to Engineering Advising; affiliated students should contact their major office. This must be done at least six weeks before the beginning of the semester in which the student wishes to return. The letter should describe the student's activities while away from Cornell, detail any academic work completed during this time, and specify the courses the student intends to take upon return.

Withdrawal from the College

A withdrawal from the College of Engineering may be voluntary or required. Following is a description of each:

Voluntary withdrawal: Students who voluntarily withdraw from the college sever all connection with the college. Unaffiliated students who wish to withdraw should do so through Engineering Advising. Affiliated students should contact their major office. If a withdrawal is requested during the semester, courses in which the student is enrolled must be dropped in accordance with applicable regulations.

A student who fails to register in the first three weeks of the semester, without benefit of a leave of absence or permission for study in absentia, will be deemed to have withdrawn.

Students who withdraw from the College of Engineering are eligible to apply for admission to one of the other six colleges at Cornell. The intrauniversity transfer process should be followed.

A student who has withdrawn and subsequently wishes to return must make a formal application for readmission. This is rarely granted. It is subject to a review of the student's academic background and depends on available space in the college and in the student's major.

Required withdrawal: Students are required to withdraw from the college only when their overall record indicates that they are either incapable of completing the program or not sufficiently motivated to do so. This action withdraws them only from the College of Engineering and does not, in and of itself,

adversely affect their ability to transfer and complete a degree in one of the other colleges in the university. Required withdrawals take precedence over voluntary withdrawals.

ENGINEERING MAJORS

This section describes the majors in the College of Engineering; the programs in which an undergraduate can study to obtain a B.S. degree.

A basic requirement of any major is a GPA \geq 2.0. Most majors have a higher GPA requirement and may have other requirements.

Honors Program within Majors

Many of the engineering majors supplement the major with an honors program.

Eligibility

The B.S. degree with honors is granted to engineering students who, *in addition* to having completed the requirements for a B.S. degree in a major, satisfactorily complete the honors program in the major and are recommended for the degree by the honors committee of that major. To enter an honors program, the student must be on track to graduate with distinction, and a student who does not stay on track to graduate with distinction is dropped from the honors program.

Courses taken to satisfy the honors requirement may not be used to satisfy B.S. degree requirements. At least 9 extra credit hours are required, and a student must be in the program for at least two semesters before graduation.

No research, independent study, or teaching for which the student is paid may be counted toward the honors program.

Procedures

An applicant to the honors program in a major must have an honors advisor: a faculty member from that major who will supervise the honors program and direct the research or project. The honors advisor need not be the student's advisor in the major.

The application for the honors program should be a letter from the student that describes the proposed honors program in detail and includes the explicit approval of the honors advisor.

Students must complete a written application no later than the beginning of the first semester of their senior year, but they are encouraged to make arrangements with the honors advisor during the second semester of their junior year. Each major may place further constraints on timing.

Major-Specific Information

Each major defines the content of the honors program and may also place other requirements on the program, in terms of timing, content, and procedures. Information is given within the description of the individual majors.

BIOLOGICAL ENGINEERING

Offered by the Department of Biological and Environmental Engineering

Contact: 207 Riley-Robb Hall, 255-2173, www.bee.cornell.edu

This major is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Biological and environmental engineering (BEE) programs address three great challenges facing humanity today: ensuring an adequate and safe food supply in an era of expanding world population; protecting and remediating the world's natural resources, including water, soil, air, biodiversity, and energy; and developing engineering systems that monitor, replace, or intervene in the mechanisms of living organisms. The biological engineering (BE) major has a unique focus on biological systems, including the environment, which is realized through a combination of fundamental engineering sciences, biology, engineering applications and design courses, and liberal studies.

Students interested in the BE major should have a strong aptitude for the sciences and math and an interest in the complex social issues that surround technology.

Students take courses in math, engineering, statistics, computing, physics, chemistry, basic and advanced biology, fundamental engineering sciences (mechanics, thermodynamics, fluid mechanics, and transport processes), and engineering design. Students select upper-level engineering courses in subjects that include bioprocessing, soil and water management, biotechnology applications, bioinstrumentation, engineering aspects of animal physiology, environmental systems analysis, sustainable energy, and waste management and disposal. Students may further strengthen their programs by completing a minor or a second engineering major. Students planning for medical school also take additional lab-based courses in chemistry and biology. Throughout the curriculum, emphasis is placed on communications and teamwork skills, and all students complete a capstone design project.

Career opportunities cover the spectrum of self-employment, private industry, public agencies, educational institutions, and graduate and professional programs in engineering and science, as well as professional fields like medicine, business, and law. In recent years, graduates have pursued careers in consulting, biotechnology, the pharmaceutical industry, biomedical engineering, management, and international development.

The living world is all around us and within us. The biological revolution continues, and it has given rise to a growing demand for engineers who have studied biology, who have strong math and science skills, who can communicate effectively, and who are sensitive to the needs of people and interested in the challenges facing society. The Biological Engineering major is designed to educate the next generation of engineers to meet these challenges.

The academic requirements* for students majoring in Biological Engineering are outlined below.

<i>Basic Subjects</i>	<i>Credits</i>
MATH 1910**, 1920, 2930, 2940	
Calculus for Engineers and Engineering Mathematics	16
PHYS 1112, 2213	8
CHEM 2090* General Chemistry	4
CHEM 1570 or 3570* Organic Chemistry	3
BEE 1510 Introduction to Computer Programming or CS 1112, and CS 1130	5
Biological Sciences*	15
Introductory (BIOG 1101-1104 recommended)	8
Biological science electives at or above 2000 level to complete 15 credits	
Biochemistry or Microbiology required	
<i>Major-required courses</i>	46
BEE 1200 The BEE Experience or ENGRG 1050 (counted as an advisor-approved elective)	1
ENGRD 2020 Mechanics of Solids	4
BEE 2600 Biological Engineering Analysis or BEE 2510 Environmental Engineering Analysis	3
BEE 3500 Biological and Environmental Transport Processes	3
BEE 2220 or ENGRD 2210 Thermodynamics	3
ENGRD 2700 or CEE 3040 Engineering Statistics and Probability	3-4
BEE 3310 or CEE 3310 Fluid Mechanics	4
Concentration courses (three courses, minimum of 9 credits, chosen from one of the following BE concentrations): Biomedical Engineering, Bioprocess Engineering, or Bio-Environmental Engineering.**	
Major-approved Engineering Electives*** (Engineering courses at or above 2000 level to bring the number of credits to 46.) One course must be a BEE Capstone course and one must be a BEE lab experience course.	
Liberal studies (two first-year writing seminars and six liberal studies electives)	24
Advisor-approved electives	6
Total (minimum)	127

*Basic accredited curriculum. See also the section on minors. Information on preprofessional study for medicine, dentistry, and veterinary medicine is available at www.career.cornell.edu.

** Students must have a competency in calculus equivalent to MATH 1110 before they attempt MATH 1910.

*** See department web page for a current list of approved courses.

Students must satisfy the College of Engineering Technical Writing requirement by including one of the approved courses in their program of study.

Biological Engineering Honors Program

The B.S. degree with honors is granted to biological engineering majors who graduate with distinction from the College of Engineering and satisfy the Honors requirements given at the beginning of the section "Engineering Majors."

The Honors program requires completion of 9 credits beyond the B.S. degree requirements drawn from the following, with at least 6 credits in the first category:

1. A significant research experience or honors project under the supervision of a BEE faculty member using BEE 4991-4992 BE Honors Research completed in their senior year. A written senior honors thesis must be submitted as part of this component.
2. A significant teaching experience under the direct supervision of a faculty member or as part of a regularly recognized course in the department under BEE 4980 Undergraduate Teaching.
3. Advanced or graduate courses. These additional courses must be technical in nature, i.e., in engineering, math, biology, chemistry, and physics at the 4000+ and graduate level.

CHEMICAL ENGINEERING

Offered by the School of Chemical and Biomolecular Engineering

Contact: 120 Olin Hall, 255-8656, www.cheme.cornell.edu

This major is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

The undergraduate major in chemical engineering comprises a coordinated sequence of courses beginning in the sophomore year and extending through the fourth year.

Students who plan to enter the major take CHEM 2080 during the freshman year. The program for the last three years is as follows:

<i>Semester 3</i>	<i>Credits</i>
MATH 2930 Engineering Mathematics	4
PHYS 2213 Physics II, Heat/Electromagnetism	4
CHEM 3890 Physical Chemistry I (engineering distribution)	4
ENGRD 2190 Mass and Energy Balances (engineering distribution)	3
Liberal Studies Distribution	3
<i>Semester 4</i>	
MATH 2940 Linear Algebra for Engineers	4
CHEME 3230 Fluid Mechanics	3
CHEM 3900 Honors Physical Chemistry II (major)	
CHEM 2900 Introductory Physical Chemistry Laboratory (major)	6
Biology elective*	3
Liberal Studies Distribution	3

Semester 5

CS 1130 Transition to OO Programming or CS 1132 Transition to MATLAB	1
CHEM 3570 Organic Chemistry for the Life Sciences	3
CHEM 2510 Introduction to Experimental Organic Chemistry	2
CHEME 3130 Chemical Engineering Thermodynamics	3
CHEME 3240 Heat and Mass Transfer	3
Liberal Studies Distribution	3

Semester 6

Advanced science elective**	3
CHEME 3010 Nonresident Lectures	1
CHEME 3320 Analysis of Separation Processes	3
CHEME 3720 Introduction to Process Dynamics and Control	2
CHEME 3900 Chemical Kinetics and Reactor Design	3
Liberal Studies Distribution	3

Semester 7

CHEME 4320 Chemical Engineering Laboratory	4
Electives***	9
Liberal Studies Distribution	3

Semester 8

CHEME 4620 Chemical Process Design	4
Liberal Studies Distribution	3
Electives***	3
Approved elective	3

*Every student must complete one of the five following options for the biology elective: (1) CHEME 2880 Biomolecular Engineering: Fundamentals and Applications. (2) advanced placement: a score of 5 on the CEEB AP exam or a score of 7 on the IB Higher Level exam. (3) 4 credits of a pre-med biology sequence: BIOG 1101 Biological Sciences, Lec (fall, 2 credits) and BIOG 1103 Biological Sciences, Lab (fall, 2 credits), BIOG 1102 Biological Sciences, Lec (spring, 2 credits) and BIOG 1104 Biological Sciences, Lab (spring, 2 credits), BIOG 1105 Introductory Biology (fall, 4 credits), BIOG 1106 Introductory Biology (spring, 4 credits), BIOG 1107 General Biology (summer, first half of eight-week session, 4 credits) or BIOG 1108 General Biology (summer, second half of eight-week session, 4 credits). (4) 3 credits of microbiology: BIOMI 2900 General Microbiology (fall, spring, or summer six-week session, 3 credits). (5) 4 credits of biochemistry: BIOBM 3300 Principles of Biochemistry, Individual Instruction (fall or spring, 4 credits) or BIOBM 3330 Principles of Biochemistry: Proteins, Metabolism, and Molecular Biology (summer six-week session, 4 credits). (6) 5 credits of biochemistry: BIOBM 3310 Principles of Biochemistry: Proteins and Metabolism (fall, 3 credits) and BIOBM 3320 Principles of Biochemistry: Molecular Biology (spring, 2 credits).

**Advanced science electives include BIOMI 2900 General Microbiology Lectures; BIOBM 3300, 3310, 3320, and 3330 Principles of Biochemistry; BME 3010 (CHEME 4010) Molecular Principles of Biomedical

Engineering; BME 3020 (CHEME 4020) Cellular Principles of Biomedical Engineering; CEE 4510 Microbiology for Environmental Engineering; CEE 6540 Aquatic Chemistry; CHEME 4700 Process Control Strategies; CHEME 4800 Chemical Processing of Electronic Materials; CHEME 4810 (BME 4810) Biomedical Engineering; CHEME 4840 Microchemical and Microfluidic Systems; CHEME 5200 An Overview of Chemical Processing; CHEME 5201 Introduction to Biomedical Engineering Module; CHEME 5202 Introduction to Electronic Materials Processing Module; CHEME 5203 Introduction to Polymer Processing; CHEME 5204 Turbo Machinery Applications; CHEME 5205 Chemical Engineering Tools and Equipment; CHEME 5207 Introduction to Petroleum Refining; CHEME 5208 Renewable Resources from Agriculture; CHEME 5430 Bioprocess Engineering; CHEME 5640 Design of Chemical Reactors; CHEME 6310 (BME 6310) Engineering Principles for Drug Delivery; CHEME 6400 Polymeric Materials; CHEME 6440 Aerosols and Colloids; CHEME 6610 Air Pollution Control; FDSC 4170 Food Chemistry I; MAE 4231 Intermediate Fluid Dynamics; MSE 2060 Atomic and Molecular Structure of Matter; MSE 3050 Electronic, Magnetic, and Dielectric Properties of Materials; MSE 5210 Properties of Solid Polymers; MSE 5240 Materials Chemistry of Synthetic Polymeric Materials; MSE 5310 Introduction to Ceramics; MSE 5410 (ECE 5360) Nanofabrication for M. Eng.; TAM 3100 Advanced Engineering Analysis I; TAM 3110 Advanced Engineering Analysis II; any AEP course numbered 3330 or above; any CHEM course numbered 3010 or above; any PHYS course numbered 3000 or above.

***The electives in semesters 7 and 8 comprise 6 credits of major-approved electives and 6 credits of advanced CHEME electives. Advanced CHEME electives include any CHEME course at the 4000+ level except CHEME 4900, 4990, 5200–5209, and 5720.

CIVIL ENGINEERING

Offered by the School of Civil and Environmental Engineering

Contact: 221 Hollister Hall, 255-3412, www.cee.cornell.edu

This major is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

While it is not necessary to do so, students may concentrate in environmental engineering, environmental fluid mechanics and hydrology, geotechnical engineering, structural engineering, transportation, or water resource systems.

Admission Requirements

Students planning to affiliate with this major must complete ENGRD 2020 Mechanics of Solids (or, ENGRD 2510 for students who do not take ENGRD 2020 before affiliation) with at least C. It is strongly recommended that ENGRD 2020 be taken as an engineering distribution during the first semester of the sophomore year.

Engineering Distribution Courses

Majors are required to take ENGRD 2020 Mechanics of Solids as an engineering

distribution course. For the second engineering distribution course, one of the following is recommended:

ENGRD 2610 Introduction to Mechanical Properties of Materials, for students interested in structural engineering and geotechnical engineering.

ENGRD 2210 Thermodynamics, for students interested in fluid mechanics and hydraulics/hydrology.

ENGRD 2110 Object Oriented Programming and Data Structures, for students interested in transportation.

ENGRD 2510 Engineering for a Sustainable Society, for students interested in environmental engineering.

Major Program

Students may substitute CHEM 2080 or CHEM 1570 for PHYS 2214. The following nine courses are required in addition to those required for the Common Curriculum.

Core Courses	Credits
ENGRD 2030 Dynamics* or CEE 4780 Structural Dynamics	3
ENGRD 3200 Engineering Computation*	3
CEE 3040 Uncertainty Analysis in Engineering†	4
CEE 3230 Engineering Economics and Management	3
CEE 3310 Fluid Mechanics	4
CEE 3410 Introduction to Geotechnical Engineering and Analysis	4
CEE 3510 Environmental Quality Engineering**	3
CEE 3610 Introduction to Transportation Engineering**	3
CEE 3710 Structural Modeling and Behavior	4

Additional requirements include a set of two major-approved electives and three design electives from a list of approved courses that is available in the school office. In addition, students must complete one technical communications course from among the courses designated ENGRD or approved communications courses. If the technical communications course also fulfills another requirement (liberal studies major-approved elective, etc.), then an additional advisor-approved elective must be taken.

*ENGRD 2030 and ENGRD 3200 can be used to satisfy a major requirement. If a student elects to use one of these courses as a second distribution course, the student must take an additional major-approved elective to fulfill the core course requirements.

†ENGRD 2700 may be substituted (by petition) for CEE 3040 in the major, but only if ENGRD 2700 is taken before affiliation, or in some special cases where co-op or study abroad programs necessitate such a substitution.

**Students may substitute CEE 3720 or CEE 4710 for either CEE 3510 or 3610, if they also complete either CEE 4730 or 4740. However, CEE 3720 or CEE 4710 then counts as a core course only and not as a CEE design course or major-approved elective.

Civil Engineering Honors Program

The B.S. degree with honors is granted to engineering students who satisfy the

requirements given at the beginning of the section "Engineering Majors" as well as the following requirements.

The 9 credits beyond the B.S. degree requirements shall be drawn from the following components (with no fewer than 2 credits in any selected component):

1. A significant research experience or honors project under the direct supervision of a CEE faculty member using CEE 4000 Senior Honors Thesis (1–6 credits per semester). A significant written report or senior honors thesis must be submitted as part of this component. Letter grades only.
2. A significant teaching experience under the direct supervision of a faculty member or as part of a regularly recognized course in the College of Engineering, i.e., CEE 4010 Undergraduate Teaching in CEE (1–3 credits per semester).
3. Advanced or graduate courses at the 5000 level or above.

Procedures

Application to the program shall be a registration form for CEE 4000 and a letter from the student describing the specific proposed honors program and including the explicit approval of the major advisor and the honors advisor. Each program must be approved by the CEE Curriculum Committee, although the committee may delegate approval authority to the associate director for all but unusual proposals.

COMPUTER SCIENCE

Offered by the Department of Computer Science

Contact: 303 Upson Hall, 255-0982, www.cs.cornell.edu

The Department of Computer Science is affiliated with both the College of Arts and Sciences and the College of Engineering. Students in either college may major in computer science.

Computer science majors take courses covering algorithms, data structures, logic, programming languages, systems, and theory. Electives include artificial intelligence, computer graphics, computer vision, cryptography, databases, networks, and scientific computing. Requirements include

- MATH 1910, 1920, and 2940
- three courses in introductory computing; either CS 1110, CS 1132, CS 2110 or CS 1112, CS 1130, CS 2110. CS 1114 is an honors-level substitute for CS 1112.
- a five-course computer science core (CS 2800, 3110, 3410 or 3420, 4410, and 4820)
- three 4000+ level computer science electives (CS 4999 not allowed; CS 3220 and CS 3810 allowed). If CS 2800 was taken prior to spring 2009, CS 3810 or CS 4810 must be either one of these electives or one of the technical electives (see below).
- a computer science project course (CS 4121, 4321, 4411, 4450, 4621, 4701, 5150, 5410, or 6670)

- three 3000+ level courses (only one of ENGRD 2700 or MATH 2930 accepted) that are technical in nature, as determined by the major.
- a three-course "external specialization" in a topic area other than computer science, all numbered at the 3000+ level
- one of BTRY 4080, ECE 3100, ECON 3190, ENGRD 2700, MATH 4710. CS majors in the College of Engineering can use ECE 3100 as a substitute for ENGRD 2700 to satisfy the engineering distribution requirements.
- an elective requirement consisting of a single 3+ credit course or a combination of courses coming to 3+ credits total. Roughly speaking, all academic courses (inside or outside of CS) count. No PE courses, courses numbered 10xx, or ROTC courses below the 3000 level are allowed.

All the major electives described above must be courses of at least 3 credits, with the exception of the CS project course, which is at least 2 credits, or as otherwise specified.

Additionally, students' course selections must satisfy the requirements of at least one "vector" or CS-centric specialization, defined by the department. The set of vectors includes artificial intelligence, computational science and engineering, data-intensive computing, graphics, human-language technologies, network science, programming languages, security and trustworthy systems, software engineering/code warrior, systems, theory, and a broad "Renaissance" vector. See www.cs.cornell.edu/ugrad for the requirements of each vector and updates.

The program is broad and rigorous, but it is structured in a way that supports in-depth study of outside areas. Intelligent course selection can set the stage for graduate study or employment in any technical area or any professional area such as business, law, or medicine. With the advisor, the computer science major is expected to put together a coherent program of study that supports career objectives and is true to the aims of a liberal education.

Computer Science Honors Program

The B.S. degree with honors is granted to engineering students who satisfy the requirements given at the beginning of the section "Engineering Majors" with a set of coherent courses and research activities that satisfy the following requirements.

1. at least one CS course (at least 3 credit hours) at or above the 5000 level with a grade of A- or better (no seminars)
2. at least two 3-credit semesters of CS 4999 (independent research), with grades of A- or better each semester

Honors determinations are made during the senior year. Students wanting to be considered for the honors program should notify the undergraduate office in the Department of Computer Science at ugrad@cs.cornell.edu. The subject line for this message should read "HONORS TRACK". Address related questions to the same e-mail address; call or stop by 303 Upson Hall, 255-0982; or visit www.cs.cornell.edu/ugrad for more information on eligibility.

ELECTRICAL AND COMPUTER ENGINEERING

Offered by the School of Electrical and Computer Engineering

Contact: Student Services Office, 223 Phillips Hall, 255-4309, www.ece.cornell.edu

This major is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

The Electrical and Computer Engineering major (ECE), leading to a B.S. degree, provides a foundation that reflects the broad scope of this engineering discipline.

Concentrations include computer architecture and organization, digital systems and computer vision; power systems control; communications, networks, information theory and coding, signal processing and optimization; electronic circuits, VLSI, solid state physics and devices, MEMs, nanotechnology, lasers and optoelectronics; electromagnetics, radiophysics, space sciences, and plasmas.

ECE majors must take ECE/ENGRD 2300 as an engineering distribution course and are encouraged, but not required, to take ENGRD 2110 as the other engineering distribution course. The major normally begins in the spring of the sophomore year. Of the courses listed below, only ENGRD/ECE 2100 and ECE/ENGRD 2300 are currently taught in both the fall and spring semesters.

Course	Credits
Major-required courses	
ECE/ENGRD 2100 Introduction to Circuits for Electrical and Computer Engineers	4
ECE 2200 Signals and Information	4
ECE 2400 Practice and Design	4
ECE 3030 Electromagnetic Fields and Waves	4
ECE/ENGRD 3100 Introduction to Probability and Random Signals	4
ECE 3140/CS 3420 or 3410 Computer Organization	4
ECE 3150 Introduction to Microelectronics	4

Major-approved electives (29-credit minimum in the following categories)

Advanced ECE electives† (six lecture courses)	
Outside ECE electives‡	9 minimum credits
Total minimum major credits	53
ECE 3100 satisfies the major requirement of probability and statistics.	

†These electives must include two 4000-level Electrical and Computer Engineering culminating design experience (CDE) courses and at least two additional courses at the 4000 level or above. The remaining electives may not include independent project courses, such as ECE 3910, 3920, 4910, or 4920, and must be at the 3000 level or above in Electrical and Computer Engineering.

Courses that meet the CDE requirement are described in the *Engineering Undergraduate Handbook*. The list changes frequently. An updated list of courses that meet the CDE requirements will be posted each semester on the bulletin board outside 222 Phillips Hall. All courses must have a college-level prerequisite.

‡Must include one course at the 3000 level or above (see the online *Electrical and Computer Engineering Undergraduate Handbook* for details).

Undergraduate concentration is achieved through the various Electrical and Computer Engineering elective courses, as well as other courses in related technical fields within engineering, math, the physical sciences, and the analytical biological sciences. The School of Electrical and Computer Engineering offers more than 30 courses that are commonly taken as electives by undergraduates.

Academic Standards

Majors in Electrical and Computer Engineering are expected to meet the following academic standards:

1. GPA \geq 2.3 every semester.
2. At least C- in all courses used to satisfy degree requirements in the major or that serve as a prerequisite for a subsequent Electrical and Computer Engineering course.
3. Satisfactory completion of MATH 2940, PHYS 2214, and at least two of ENGRD/ECE 2100, ECE 2200, and ENGRD/ECE 2300 by the end of the sophomore year and adequate progress toward the degree in subsequent semesters.

ENGINEERING PHYSICS

Offered by the School of Applied and Engineering Physics

Contact: 212 Clark Hall, 255-5198, www.aep.cornell.edu

The engineering physics (EP) major is designed for students who want to pursue careers of research or development in applied science or advanced technology and engineering. Its distinguishing feature is a focus on the physics and math fundamentals, both experimental and theoretical, that are at the base of modern engineering and research and have a broad applicability in these areas. By choosing areas of concentration within this major, students may combine this physics base with a good background in a conventional area of engineering or applied science.

The industrial demand for EP B.S. graduates is high, and many students go directly to industrial positions where they work in a variety of engineering or developmental areas that either combine, or are in the realm of, various more conventional areas of engineering. Recent examples include bioengineering, computer technology, electronic-circuit and instrumentation design, energy conversion, environmental engineering, geological analysis, laser and optical technology, microwave technology, nuclear technology, software engineering, solid-state-device development, technical management, and financial consulting. A number of EP graduates go on for advanced study in all areas of basic and applied physics as well as in a diverse range of areas in advanced science and engineering. Examples include applied physics, astrophysics, atmospheric sciences, biophysics, cell biology, computer science and engineering, electrical engineering, environmental science, fluid mechanics, geotechnology, laser optics, materials science and engineering,

mathematics, mechanical engineering, medical physics, medicine, nuclear engineering, plasma physics, oceanography, and physics. The major can also serve as an excellent preparation for medical school, business school, or specialization in patent law.

The EP major fosters this breadth of opportunity because it both stresses the fundamentals of science and engineering and gives the student direct exposure to the application of these fundamentals. Laboratory experimentation is emphasized, and ample opportunity for innovative design is provided. Examples are ENGRI/AEP 1110 Lasers and Photonics; ENGRI/AEP 1200 Introduction to Nanoscience and Nanoengineering; ENGRD/AEP 2640 Computer-Instrumentation Design (a recommended sophomore engineering distribution course); AEP 3330 Modern Experimental Optics (a junior/senior course); AEP 3630 Electronic Circuits (a sophomore/junior course); PHYS 4410 Advanced Experimental Physics; and AEP 4380 Computational Engineering Physics (a senior computer laboratory).

Students who plan to affiliate with the EP major are advised to arrange their common curriculum with their developing career goals in mind. They are encouraged to take PHYS 1112 or 1116 during their first semester (if AP credits permit) and to satisfy the technical writing requirement with the engineering distribution course ENGRD 2640. EP students need to take only one engineering distribution course, since AEP 3330, taken in the junior year, counts as the second one. EP students are advised to take AEP 3630 (taking ECE 2100 and 2300, 4 credits each, can satisfy AEP 3630. Count ECE 2100 as an approved elective and ECE 2300 as AEP 3630) in the spring semester of the sophomore year. Students with one semester of advanced placement in math and who have received at least A- in MATH 1920 may wish to explore accelerating their math requirements so as to enroll in AEP 3210 and 3220 in the sophomore year. For advice on this option, consult with the AEP associate director.

In addition to the requirements of the Engineering Common Curriculum,* the major requirements are as follows:

Course	Credits
AEP 3330 Mechanics of Particles and Solid Bodies	4
AEP 3550 Intermediate Electromagnetism	2
AEP 3560 Intermediate Electrodynamics	4
AEP 3610 Introductory Quantum Mechanics	2
AEP 3620 Intermediate Quantum Mechanics	4
AEP 3630 Electronic Circuits	4
AEP 4230 Statistical Thermodynamics	4
AEP 4340 Continuum Physics	4
PHYS 4410 Advanced Experimental Physics	4
AEP 3210 Mathematical Physics I	4
AEP 3220 Mathematical Physics II	4

Six major-approved electives (18–23 credits), of which five must be technical upper-level courses (3000 or above).

Total major credits=58 credit hours minimum

*The Engineering Common Curriculum suggests that freshmen take only four courses each semester. This course load is fully consistent with the requirements of the EP

major, but freshmen with strong preparation are encouraged to consider taking an additional course during one or both semesters so that they may have additional flexibility in developing a strong, individualized educational program in their later years and for allowing options such as a semester or year abroad or early graduation.

Two of the 4 credits of PHYS 4410 required for the B.S. degree in EP can be satisfied by completing AEP/PHYS 3330 or ASTRO 4410. The remaining 2 credits of PHYS 4410 can then be satisfied by taking PHYS 4400 for 2 credits, provided that the experiments completed in PHYS 4400 do not overlap with those in AEP/PHYS 3330 or ASTRO 4410. (A list of experiments that are not appropriate will be prepared by AEP faculty and made available in the AEP office.) If a student chooses this option, AEP/PHYS 3330 or ASTRO 4410 may also count as a technical elective, provided the remaining three technical electives are 4 credits each.

Choosing elective courses. The EP major provides the students with a strong opportunity to develop individualized programs of study to meet their particular educational and career goals. These can include the pursuit of a dual major or the development of a broad expertise in a number of advanced technical and scientific areas. With at least seven electives in the sophomore, junior, and senior years, EP majors are encouraged to work closely with their advisor to develop a coherent academic program that is consistent with those goals. For students who look toward an industrial position after graduation, the electives should be chosen to widen their background in a specific area of practical engineering. A different set of electives can be selected as preparation for medical, law, or business school. For students who plan on graduate studies, the electives provide an excellent opportunity to explore upper-level and graduate courses and to prepare for graduate study in any one of a number of fields. Various programs are described in a special brochure available from the School of AEP, Clark Hall. Students are advised to consult with their EP advisor, a professor active in their area of interest, or the associate director of the school.

Electives need not be all formal course work; qualified students are encouraged to undertake independent study under the direction of a member of the faculty (AEP 4900). This may include research or design projects in areas in which faculty members are active.

Up to three “4900” courses may be used as a major approved electives. These courses must be taken during the student’s last four semesters as an undergraduate. Any additional “4900” credits may be used as “advisor-approved electives.”

The variety of course offerings and many electives provide flexibility in scheduling. If scheduling conflicts arise, the school may allow substitution of courses nearly equivalent to the listed required courses.

Academic Standing

Students are expected to pass every course in which they are registered, to earn at least C- in specifically required courses, and to attain a semester GPA ≥ 2.3 each semester. Students are required to take a minimum of 12 credit hours per semester.

Engineering Physics Honors Program Requirements

Eligibility

The Bachelor of Science degree with honors will be conferred upon those students who, in addition to having completed the requirements for a bachelor degree, have satisfactorily completed the honors program in the School of Engineering Physics and have been recommended for the degree by the honors committee of the department. An honors program student must enter with and maintain a cumulative GPA ≥ 3.5 or must be eligible for one of the cum laude distinctions at the time of graduation.

Content

The student must

1. Complete at least 8 credits of field-approved electives at the 4000 level or higher and receive a minimum grade of an A- in each of the courses taken to fulfill this 8-credit requirement. These 8 credits are in addition to the credits obtained by completing the senior thesis or special project requirement as discussed in item 2.
2. Enroll in AEP 4900 or an equivalent course over two semesters for the purpose of completing an independent research project or senior thesis under the supervision of a Cornell engineering or science faculty member. For a 4900 project to satisfy the research component of an honors project, it must have substantial physical science content. The minimum enrollment is to be 2 credits in the first semester and 4 credits in the second. The level of work required for a successful completion of this project or thesis is to be consistent with the amount of academic credit granted.

Timing

All interested students must complete a written application no later than the end of the third week of the first semester of their senior year, but are encouraged to make arrangements with a faculty member during the second semester of their junior year. A student must be in the program for at least two semesters before graduation. Most often, these 4900 courses are taken during the student’s senior year, after completion of the EP junior-year curriculum. Students may apply for honors after early completion of AEP 3210 and AEP 3220. However, for the project to be considered for honors, the proposal must be approved within three weeks of the start of the semester.

Procedures

Before enrolling in AEP 4900, or the equivalent, the honors candidate must submit a brief proposal outlining the topic and scope of the proposed project or thesis and a faculty supervisor’s written concurrence to the associate director for undergraduate studies. This proposal will be reviewed by the AEP Honors Committee and either approved or returned to the candidate to correct deficiencies in the proposal. The proposed research project or senior thesis is to consist of a research, development, or design project and must go beyond a literature search. This proposal must clearly describe a self-contained, independent project that can be

completed within two semesters. The final steps in completing the honors project are a written and oral report. The written report is to be in the form of a technical paper with, for example, an abstract, introduction, methods section, results section, conclusions section, references, and figures. This report will be evaluated by the faculty supervisor and the chair of the AEP Honors Committee and at least one other departmental faculty member, along with the other honors candidates. The final research project course grade will be assigned by the faculty supervisor, following the oral presentation and after consultation with the chair of the honors committee. A minimum grade of A- is required for successful completion of the honors requirements.

ENVIRONMENTAL ENGINEERING

Offered jointly by the Department of Biological and Environmental Engineering and the School of Civil and Environmental Engineering.

Contact: 207 Riley-Robb Hall, 607 255-2173, www.bee.cornell.edu, or 221 Hollister Hall, 607 255-3412, www.cee.cornell.edu.

Environmental Engineering is the study and practice of analyzing, designing, and managing natural and engineered systems in ways consistent with the maintenance or enhancement of environmental quality and sustainability. It requires the ability to predict multiple interactions and impacts among natural and engineering-system components at various spatial and temporal scales in response to alternative design and management policies. It requires a thorough understanding of the interactions among the natural environment, the constructed environment, and human activities.

Students matriculating in the College of Engineering (CoE) may affiliate with this major in their second year. Students matriculating in the College of Agriculture and Life Sciences (CALS) may enroll in this major in their first semester. Students planning to graduate with this major will be taking the following courses:

Mathematics-science core requirements

Course	Credits
MATH 1910, 1920, 2930, 2940	16
PHYS 1112, 2213	8
CHEM 2090 and 1570	7

CS 1110, CS 1112, or BEE 1510^a followed by CS 1132 or CS 1130

Introduction to engineering^b

ENGR 1130 Sustainable Design for Appledore Island (recommended), or

BEE 1200 The BEE Experience^a (required for students matriculating in CALS)

Engineering distribution courses[†]

BEE/ENGRD 2510 Engineering for a Sustainable Society (required)	3
ENGRD 2020, 3200, or 2210 are recommended ^c (BIOG 1101-1103, BIOG 1105, or BIOG 1107 may be used)	3-4

Major-required courses

Major Courses	Credits
Introductory Biology ^d (select from BIOG 1101-1103, BIOG 1102-1104, BIOG 1105, BIOG 1106, BIOG 1107, BIOG 1109, or BIOG 1110 to satisfy the biology requirement)	3-4
ENGRD 2020 Mechanics of Solids ^d	4
ENGRD 3200 Engineering Computation ^d	3
or	
ENGRD 2210 Thermodynamics ^d	3
CEE 3040 Uncertainty Analysis in Engineering ^e	4
CEE 3310 Fluid Mechanics	4
Earth Science (one from the following list):	3-4
EAS 2200 The Earth System	
or	
EAS 2680 Climate and Global Warming	
or	
EAS 3030 Introduction to Biogeochemistry	
or	
CSS 3650 Environmental Chemistry: Soil, Air, and Water	
CEE 3510 Environmental Quality Engineering	3
CEE 4510 Microbiology for Environmental Engineering ^f	3
Laboratory Course (one from the following list):	3
CEE 4530 Lab Research in Environmental Engineering	
or	
BEE 4270 Water Measurement and Analysis Methods	
or	
CEE 4370 Experimental Methods in Fluid Dynamics	
BEE 4750 Environmental Systems Analysis	3
Engineering Economics:	3-4
CEE 3230 Engineering Economics and Management	
or	
BEE 4890 Entrepreneurial Management for Engineers	
Electives	
Technical communications course ^g (ENGR 3350 or 3500 in liberal studies category; COMM 2600, 2630, or 3520; or BEE 4730, or BEE 4890)	
Three environmental design electives: at least one from list of capstone design courses and the remainder from list of design courses 9-credit minimum ^h	
Two major-approved engineering electives to complete total credit requirement ⁱ	6
First-year writing seminar	6
Two approved electives	6
Liberal studies	18
Total credits (minimum)	126
a. BEE 1510 and 1200 together (5 credits) satisfy the ENGR 1130 requirement for CALS-	

matriculated first-year students. Students using BEE 1200 and BEE 1510 to satisfy the ENGR 1130 requirement must make up the 2-credit difference with engineering course work.

- COE matriculated students must complete one ENGR 1XXX course their first year. CALS matriculated students may complete BEE 1510 and BEE 1200 to meet the requirement.
- Students must complete two ENGRD courses.
- Students using this course as a second engineering distribution must take an additional major-approved elective. Note: Some Intro to Biology courses do not count as an engineering distribution course.
- ENGRD 2700 (f,s,3) may be accepted (by petition) to substitute for CEE 3040 if taken prior to affiliation with the Environmental Engineering major or if necessary because of scheduling conflicts caused by co-op or study abroad.
- Students may take BIOMI 2900 Introduction to Microbiology in place of CEE 4510.
- If the course fulfilling the technical writing requirement also fulfills another requirement (e.g., liberal studies, major-approved elective), then it may be used to satisfy both requirements.
- To be chosen from a list of design courses. Students are encouraged to take CEE 4520, CEE 4540, or BEE 4730.
- The list of suggested courses covers the areas of environmental engineering, hydraulics/hydrology, environmental systems engineering, geotechnical engineering, remote sensing, air pollution, and renewable energy systems. The respective lists are available at the departmental offices.

Environmental Engineering Honors Program

Students interested in pursuing an honors program should contact the undergraduate program director of Biological and Environmental Engineering or the associate director of Civil and Environmental Engineering for information on the program requirements.

INDEPENDENT MAJOR

Offered by the Independent Major Committee

Contact: Associate Dean for Undergraduate Programs, 167 Olin Hall, 255-8240

The independent major is designed for students whose educational objectives cannot be met by one of the regular majors. This major consists of an engineering primary area (32 credits) and an educationally related secondary area (16 credits). The primary area may be in any subject area offered by schools or departments of the college; the secondary area may be in a second engineering subject area or in a logically connected non-engineering area. The combination must form an engineering education in scope and substance and should include engineering design and synthesis as well as engineering sciences. Each program includes the normally required common-

curriculum requirements and approved electives.

Students should apply to the independent major during the sophomore year. A student should seek assistance in developing a coherent program from professors in the proposed primary and secondary areas (an advisor in each area is required). The program must also be approved by the Independent Major Committee. If approved, the program is the curricular contract to which the student must adhere.

Because no single standardized curriculum exists, the independent major is not accredited by ABET. Independent major students who intend to seek legal licensing as a Professional Engineer should be aware that this nonaccredited degree program will require additional education, work, and/or experience to qualify for eligibility to take the Fundamentals of Engineering examination and may affect acceptance into engineering graduate programs.

INFORMATION SCIENCE, SYSTEMS, AND TECHNOLOGY

Offered jointly by the Department of Computer Science and the School of Operations Research and Information Engineering

Contact: 303 Upson Hall, 255-9837, www.infosci.cornell.edu, or 202 Rhodes Hall, 255-5088, www.orie.cornell.edu

Digital information technologies have become pervasive in science, engineering, manufacturing, business, finance, culture, law, and government, dramatically changing the way people work and live. The proliferation and significance of these new technologies demands a new focus in engineering education—one that remains rigorous and technically oriented but is simultaneously devoted to integrating engineering design, theory, and practice within the social and organizational contexts in which these complex digital information systems are employed.

The information science, systems, and technology (ISST) major studies the design and management of complex information systems. Just as structural engineers and nanofabricators use physics at radically different scales, so also there is a scale difference between the focus of the ISST major and the more traditional, look-under-the-hood majors in computer science and operations research and industrial engineering. Rather than focusing on the computing and communication technologies that underlie digital information systems, the ISST major emphasizes information systems engineering in broad application contexts, where issues at the confluence of information science, technology, and management are the primary concerns.

The ISST major has two options. The management science option educates students in methods for quantitative decision making and their application to information technology as well as the broader role that information technology plays in making these methods effective. Students in the information science option will obtain advanced training in methods for the creation, representation, organization, access, and analysis of information in digital form.

Note: Students may not double major in both CS and ISST or ORIE and ISST.

Engineering distribution courses

Majors are required to take ENGRD 2700 Basic Engineering Probability and Statistics as an engineering distribution course. ENGRD 2110 Object-Oriented Programming and Data Structures is required for the major and is recommended as the second engineering distribution course.

Major program

<i>Core courses</i>	<i>Credits</i>
Probability, Statistics, and Optimization	
ORIE 3300 Optimization I	4
ORIE 3500 Engineering Probability and Statistics II	4
Information Systems	
INFO 2300 Intermediate Design and Programming for the Web	3
ORIE 3800 Information Systems and Analysis	4
INFO 3300 Data-Driven Web Applications	3
Economic, Organizational, and Social Context	
ECON 3010 or 3130 Microeconomics	4
One of:	
ILROB 1750 Behavior, Values, and Performance	3
INFO 2450 Communication and Technology	3
ENGRD 3350 Communications for Engineering Majors	3

Requirements for the information science option:

1. Three courses from Information Systems (Area II below).
2. One course from Mathematical Modeling in IT (Area III).
3. Three electives, all from either Human-Centered Systems (Area V) or Social Systems (Area VI).
4. Two electives from any of the six areas totaling at least 6 credits (INFO 4900 may be used to fulfill one of these electives).

Requirements for the management science option:

1. Four courses from Mathematical Models in Management Science (Area I).
2. Three electives, one from Information Systems (Area II) and two from the union of Mathematical Modeling in IT (Area III) and Information Technology Management Solutions (Area IV).
3. Two electives from any of the six areas totaling at least 6 credits (INFO 4900 may be used to fulfill one of these electives).

Area I. Mathematical Models in Management Science

- ORIE 3150 Financial and Managerial Accounting
- ORIE 3510 Introductory Engineering Stochastic Processes I
- ORIE 4580 Simulation Modeling and Analysis
- ORIE 4800 Information Technology

Area II. Information Systems

- CS 4450 Computer Networks
- INFO 4300 Information Retrieval
- INFO 4302 Web Information Systems
- CS 4320 Introduction to Database Systems
- CS 4620 Introduction to Computer Graphics
- CS 4700 Foundations of Artificial Intelligence
- CS 4740 Introduction to Natural Language Processing
- CS 5150 Software Engineering
- CS 5430 System Security
- INFO 5300 Architecture of Large-Scale Information Systems
- CS 5780 Empirical Methods in Machine Learning and Data Mining

Area III. Mathematical Modeling in IT

- ORIE 4330 Discrete Models
- ORIE 4740 Statistical Data Mining I
- CS 4780 Machine Learning
- ORIE 4850 Applications of Operations Research and Game Theory to IT
- ECE 5620 Fundamental Information Theory

Area IV. IT Management Solutions

- ORIE 4810 Delivering OR Solutions with Information Technology
- ORIE 5126 Supply Chain Management

Area V. Human-Centered Systems

- INFO 3400 Psychology of Social Computing
- PSYCH 3420 Human Perceptions: Applications to Computer Graphics, Art, and Visual Display*
- INFO 3450 Human-Computer Interaction Design
- PSYCH 3470 Psychology of Visual Communications
- INFO 3650 Technology and Collaboration
- PSYCH 3800 Social Cognition*
- PSYCH 4160 Modeling Perception and Cognition*
- INFO 4400 Advanced Human-Computer Interaction Design
- INFO 4450 Seminar in Computer-Mediated Communication
- INFO 4500 Language and Technology
- DEA 4700 Applied Ergonomic Methods

*Students who take PSYCH 3420 or 4160 may also count their prerequisite, PSYCH 2050 or 2140. Students who take PSYCH 3800 may also count PSYCH 2800. At most one of these 2000-level prerequisites can be counted.

Area VI. Social Systems

- INFO 2040 Networks
- SOC 3040 Social Networks and Social Processes
- INFO 3200 New Media and Society*
- AEM 3220 Internet Strategy
- INFO 3490 Media Technologies
- INFO 3551 Computers: From the 17th Century to the Dotcom Boom
- INFO 3561 Computing Cultures

INFO 3660 History and Theory of Digital Art

ECON 3680 Game Theory*

INFO 3871 The Automatic Lifestyle: Consumer Culture and Technology

STS 4111 Knowledge, Technology, and Property

SOC 4150 Internet and Society*

ECON 4190 Economic Decisions Under Uncertainty

INFO 4290 Copyright in the Digital Age

INFO 4350 Seminar on Applications of Information Science

ORIE 4350 Introduction to Game Theory*

INFO 4144 Responsive Environments

INFO 4470 Social and Economic Data

INFO 4850 Computational Methods for Computer Networks

ECON 4760 Decision Theory I

ECON 4770 Decision Theory II

HADM 4489 The Law of the Internet and E-Commerce

INFO 5150 Culture, Law, and Politics of the Internet

*Only one of ECON 3680 and ORIE 4350 may be taken for ISST credit. Only one of INFO 3200 and SOC 4150 may be taken for ISST credit.

Information Science, Systems, and Technology Honors Program

The B.S. degree with honors is granted to engineering students who satisfy the requirements given at the beginning of the section "Engineering Majors" as well as the following requirements.

- 3 credit hours of ISST course work at or above the 5000 level (no S-U courses; no seminars or 2-credit courses)
- 6 credit hours of INFO 4900 independent study and research with an ISST faculty member, spread over at least two semesters, with at least A- each semester
or

3 credit hours of INFO 4900 independent study and research with an ISST faculty member and 3 credit hours of INFO 4910 teaching experience, both with grades of at least A-.

The ISST research is expected to result in a programming project or a written report (or both).

Any 5000- or 6000-level course taken to fulfill the honors requirements may not be counted toward fulfillment of the associated primary or secondary option requirements.

Procedures

Each program must be approved by the appropriate co-director of the ISST major, and any changes to the student's program must also be approved.

MATERIALS SCIENCE AND ENGINEERING

Offered by the Department of Materials Science and Engineering

Contact: 214 Bard Hall, 255-9159, www.mse.cornell.edu

This major is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Prospective majors are required to take ENGRD 2610 or 2620 before affiliating with the major. It is highly recommended that the course be taken as an engineering distribution during the sophomore year.

The major program develops a comprehensive understanding of the physics and chemistry underlying the unique properties of modern engineering materials and processes.

Students complete a series of electives to develop knowledge of materials, such as biomaterials, ceramics, polymers, and semiconductors. Application-related courses include areas of biotechnology and life science, energy and environment, materials for information science, nanotechnology, and technology management and ethics. These requirements are satisfied through a series of technical electives taken mainly in the senior year, which are selected from various engineering and science departments. Optional research involvement courses provide undergraduates with the opportunity to work with faculty members and their research groups on current projects.

The major requirements for a B.S. degree in materials science and engineering are:

- ENGRD 2610 Mechanical Properties of Materials: From Nanodevices to Superstructures *or*
ENGRD 2620 Electronic Materials for the Information Age
- 13 required major courses:
MSE 2060 Atomic and Molecular Structure of Matter
MSE 2610 or MSE 2620 (whichever was not taken as a distribution course)
MSE 3010 Materials Chemistry
MSE 3030 Thermodynamics of Condensed Systems
MSE 3040 Kinetics, Diffusion, and Phase Transformations
MSE 3050 Electronic, Magnetic, and Dielectric Properties of Materials
MSE 3070 Materials Design Concepts I
MSE 3110 Junior Lab I
MSE 3120 Junior Lab II
MSE 4020 Mechanical Properties of Materials, Processing, and Design
MSE 4030/4050 Senior Materials Lab I or Senior Thesis I
MSE 4040/4060 Senior Materials Lab II or Senior Thesis II
MSE 4070 Materials Design Concepts II
- Two materials-related electives covering two groups of different materials
- Three application-related electives in at least two different types of applications

- Two of the application-related electives must be taken from outside MSE
- One additional technical elective outside MSE

Materials Science and Engineering Honors Program

The B.S. degree with honors is granted to engineering students who satisfy the requirements given at the beginning of the section "Engineering Majors" as well as the following requirements.

- The 9 credits (giving a total of 141) of additional courses must be technical in nature, i.e., in engineering, math, chemistry, and physics at the 4000 and graduate level, with selected courses at the 3000 level. The courses must be approved by the major advisor.
- Senior honors thesis (MSE 4050/4060) with a grade of at least A.

MECHANICAL ENGINEERING

Offered by the Sibley School of Mechanical and Aerospace Engineering

Contact: 108 Upson Hall, 255-3573, maeng-mailbox@cornell.edu, www.mae.cornell.edu

This major is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

This major is designed to provide a broad background in the fundamentals of the discipline as well as to offer an introduction to the many professional and technical areas in which mechanical engineers work. The program covers both major streams of mechanical engineering.

(1) *Mechanical systems, design, and materials processing* is concerned with the design, analysis, testing, and manufacture of machinery, vehicles, devices, and systems. Other topics covered are computer-aided design, vibrations, control systems, and dynamics. Particular areas of concentration are mechanical systems and design, vehicle engineering, biomechanics, and engineering materials.

(2) *Engineering of fluids, energy, and heat-transfer systems* is concerned with the efficient conversion of energy, aerospace and surface transportation, the environmental impact of engineering activity (including pollutants and noise), aeronautics, and the experimental and theoretical aspects of fluid flow, heat transfer, thermodynamics, and combustion. Specific areas of concentration include aerospace engineering, energy and the environment, and thermo-fluids engineering.

During the fall semester, sophomores who plan to affiliate with the mechanical engineering major take ENGRD 2020 (also TAM 2020) as an engineering distribution course. ENGRD 2210/MAE 2210 is required for the major and is recommended as the second engineering distribution course. The Sibley School supports students who have unusual requirements, but delays or substitutions must be discussed with and receive approval from their major advisor.

The major requires 13 courses (beyond ENGRD 2020 already mentioned) and five major-approved elective courses.

Required courses

MAE 2120 Mechanical Properties and Selection of Engineering Materials

ENGRD 2210 Thermodynamics

MAE 2250 Mechanical Synthesis

ENGRD 2030 Dynamics

MAE 3780 Mechatronics *or* ENGRD 2100 Introduction to Electrical Circuits, Electrical and Computer Engineering, or PHYS 3360 Electronic Circuits

MAE 3230 Introductory Fluid Mechanics

MAE 3240 Heat Transfer

MAE 3250 Analysis of Mechanical and Aerospace Structures

MAE 3260 System Dynamics

MAE 3272 Mechanical Property and Performance Laboratory

MAE 4272 Fluids/Heat Transfer Laboratory

MAE 4280 Engineering Design

MAE 4291 Supervised Senior Design Experience

Electives

Students should use the flexibility provided by the major-approved electives, advisor-approved electives, and humanities, arts, and social sciences electives to develop a program to meet their specific goals.

Major-approved electives

The major includes five major-approved electives. At least three of these courses must be upper-level (3000+) MAE courses. Two of these must be a concentration of MAE's upper-level courses providing depth in a specific subject area. Standard concentrations are shown below, but students may petition for approval of two other related courses to form a custom concentration.

The standard concentrations are:

Aerospace engineering, MAE 3050, 3060, 4150, 4230, 5060, 5070

Biomechanics, MAE 4640, 4660, 5680, 5690

Energy and the Environment, MAE 4020, 4230, 4490, 4580, 4590, 5010, 5430

Engineering Materials, MAE 3120, 3130, 4040, 4140, 4550, 4640, 4700, 5130

Mechanical Systems and Design, MAE 3780*, 4150, 4170, 4700, 4770, 4780, 5200**

Thermo-fluids Engineering, MAE 4230, 4490, 4530, 5010, 5430

Vehicle Engineering, MAE 3050, 3060, 4140, 4250, 4490, 4860, 5060, 5070

*Students who took MAE 3780 as a required course (see above) may not use it again as a major-approved elective.

** MAE 5200 is a 2-credit course. If it is used in a concentration, another course or courses in the concentration must be selected so that the total number of credits in the concentration is 6 or greater.

One major-approved elective must be a senior design elective involving MAE 4291 "Supervised Senior Design Experience." One way to satisfy this requirement is to take a 3+ credit section of MAE 4291, directed by a faculty member as a individual or team exercise. The other option is to take a senior

design elective course (MAE 4000, 4020, 4040, 4140, 4230, 4250, 4700, or 4860) along with the corresponding 1-credit section of MAE 4291.

One of the major-approved electives must be an approved upper-level math course taken after MATH 2940. The course must include some statistics. Currently, the approved courses are TAM 3100, ENGRD 2700, CEE 3040, and ENGRD 3200.

One of the major-approved electives, the "technical elective," may be any course at an appropriate level, chosen from engineering, math, or science (physics, chemistry, or biological sciences). Appropriate level is interpreted as being at a level beyond the required courses of the college curriculum. Courses in economics, business, and organizational behavior are not accepted; advisors may approve such courses as advisor-approved electives.

MAE 4980 may not be used as a major-approved elective.

Advisor-approved electives

To maximize flexibility (i.e., the option for study abroad, Co-op, internships, pre-med, and flexibility during the upper-class years), the Sibley School faculty recommends that students delay use of advisor-approved (AA) electives until after the third semester. Students must seek advisor approval before taking an AA elective. Advanced placement credit may not count as an AA elective. Up to 6 credits of Reserve Officer Training Corps (ROTC) courses numbered 3000 or above or co-listed in an academic department are allowed as AA electives. Students must document AA electives approved before MAE affiliation within a month of registration as an MAE student. The faculty encourages students to consider the following as possible AA electives:

- an engineering distribution course
- courses stressing oral or written communications
- courses stressing the history of technology
- rigorous courses in the physical sciences (physics, biology, chemistry)
- courses in information science (mathematics, computer science)
- courses in methodologies (modeling, problem solving, synthesis, design)
- courses in technology (equipment, machinery, instruments, devices, processes)
- courses in business enterprise operations (e.g., economics, financial, legal)
- courses in organizational behavior
- courses in cognitive sciences

Other considerations

It is recommended that humanities, arts, and social sciences electives include studies in history of technology, societal impacts of technology, history, foreign languages, ethics, communications, political science, aesthetics, economics, and/or architecture.

The Sibley School encourages its students to spend a semester or year abroad at foreign universities with which the college has an exchange agreement, such as the Ecole Centrale de Paris.

The technical-writing requirement of the common curriculum is satisfied by MAE 4272.

A limited set of second- and third-year courses is offered each summer under the auspices of the School of Continuing Education and Summer Sessions and the Engineering Cooperative Education Program.

Preparation in Aerospace Engineering

There is no separate undergraduate major in aerospace engineering, but students may prepare for a career or graduate program in this area by majoring in mechanical engineering and taking courses from the aerospace engineering minor or concentration, for example spacecraft engineering, introduction to aeronautics, and aerospace propulsion systems. It is also possible to prepare for a career or graduate program in aerospace engineering through appropriate course selection in other majors, for example: electrical and computer engineering, engineering physics, or the physical sciences. Subjects recommended as preparation for aerospace engineering endeavors include thermodynamics, fluid mechanics, structures, vibrations, feedback controls, applied mathematics, chemistry, and physics.

OPERATIONS RESEARCH AND ENGINEERING

Offered by the School of Operations Research and Information Engineering

Contact: 203 Rhodes Hall, 255-5088, www.orie.cornell.edu

This major provides a broad education in the techniques and modeling concepts needed to design, analyze, and operate complex systems. The major prepares students for a wide range of careers including operations research, information engineering, entrepreneurship, operations management, consulting, financial engineering, financial services, and engineering management.

The foundation of the major is the development of basic skills in statistics, probability, mathematical optimization, and computer science. Required courses in manufacturing systems, cost accounting, and simulation build on these skills and provide engineering design experiences. In the senior year the curriculum is quite flexible. Students take ORIE electives to broaden and deepen their expertise in applied probability and statistics, industrial systems, optimization, information technology, financial engineering, and their applications.

Because of the wide range of career goals among OR&E students, and the large number of electives, students should consult with their major advisors to select electives that best meet their future goals.

Exceptional students interested in pursuing graduate studies are encouraged to speak with their faculty advisors concerning an accelerated program of study.

A student who intends to affiliate with the major in operations research and engineering should take ENGRD 2700 Basic Engineering Probability and Statistics after completing MATH 1920; MATH 2940 should be completed before or concurrently with ENGRD 2700. OR&E affiliates are required to complete

MATH 1910, 1920, and 2940 (or their subject matter equivalents). Either MATH 2930, CS 2800, or MATH 3040 may be used to satisfy the fourth-semester mathematics requirement. Students should discuss with their advisors which of these three courses is most appropriate to their future program of study in OR&E. The following should be considered:

1. MATH 2930 (differential equations) is essential for advanced study in financial engineering. Also, MATH 2930 is a prerequisite for PHYS 2214, thus students who do not take MATH 2930 must plan to take CHEM 2080.
2. CS 2800 provides an introduction to discrete structures and algorithms of broad applicability in the field of operations research, particularly for fundamental models in the areas of optimization, production scheduling, inventory management, and information technology; it is also a prerequisite for certain upper-class Computer Science courses in the areas of information technology and algorithmic analysis.
3. MATH 3040 covers fundamentals of formal proof techniques.

Early consultation with a faculty member or the associate director for undergraduate studies may be helpful in making appropriate choices. Students considering Ph.D.-level study in operations research are encouraged to see the Associate Director for advice regarding the fourth MATH course.

The required courses for the OR&E major and the typical terms in which they are taken are as follows:

<i>Semester 2 or 3</i>	<i>Credits</i>
ENGRD 2110 Computers and Programming	3
ENGRD 2700 Basic Engineering Probability and Statistics	3
<i>Semester 4</i>	
ORIE 3120 Industrial Data and Systems Analysis*	4
<i>Semester 5</i>	
ORIE 3300 Optimization I	4
ORIE 3500 Engineering Probability and Statistics II	4
Behavioral Science (Organizational Behavior)†	3
Liberal elective	3
Advisor-approved elective	3
<i>Semester 6</i>	
ORIE 3150 Financial and Managerial Accounting (may be taken in semester 4)**	4
ORIE 3310 Optimization II	4
ORIE 3510 Introductory Engineering Stochastic Processes I	4
Major-approved elective	3
Liberal elective	3

*It is highly recommended that ORIE 3120 be taken in semester 4. If the student's schedule does not permit this, the course may be taken in semester 6 or 8.

**ORIE 3150 may be taken in semester 4, 5, or 6.

†The behavioral science requirement can be satisfied by any of several courses, including the Johnson Graduate School of Management

(JGSM) course NCC 5540 (offered only in the fall), which is recommended for those considering a graduate business degree, ILROB 1220, and 1750, HADM 1115, ENGRD 3350 (which also satisfies the technical writing requirement), and others.

The basic senior-year program, from which individualized programs are developed, consists of the following courses:

ORIE 4580 Simulation Modeling and Analysis 4

Three upper-level ORIE electives as described below 9

Two major-approved electives (at least 3 credits must be outside ORIE) 6

Liberal electives 6

One advisor-approved elective 3

Available ORIE electives are as follows:

Manufacturing and distribution systems: ORIE 4150, 4800, 4810, 4850, 5100, 5120, 5122, 5126 and JGSM NBA 6410

Optimization methods: ORIE 4154, 4300, 4320, 4330, 4350, 4360, and 4370

Applied probability and statistics: ORIE 4520, 4540, 4710 (2 credits), 4740, 4711 (2 credits), 4712 (2 credits), 5550, 5560, and 5770

Financial engineering: ORIE 4600, 4630, 5600, 5610, 5620, and 5640

Academic Standing

Each student in the OR&E major should obtain a passing grade in every course; at least C- in ENGRD 2110 and 2700, and all ORIE courses; a GPA of 2.0 each semester; a GPA of 2.0 for OR&E major courses; a grade of C- or better in ENGRD 2110 by the end of the sixth semester; and satisfactory progress toward completion of the degree requirements. Each student's performance is reviewed at the conclusion of each semester.

If at least C- is not earned in a required course, the course must be repeated within one year. The next course in a sequence (ORIE 3310 and 3510, in particular) may not be taken until at least a C- is achieved in the prerequisite course. Failure to achieve at least C- in the second attempt will generally result in withdrawal from the major.

Operations Research and Engineering Honors Program

The B.S. degree with honors is granted to engineering students who satisfy the requirements given at the beginning of the section "Engineering Majors" as well as the following requirements.

The 9 additional credits of course work shall be from one or more of the following, with at least 4 credits in the first category:

1. Advanced courses in ORIE at the 5000 level or above.
2. A significant research experience or honors project under the direct supervision of an ORIE faculty member using ORIE 4999 ORIE Project. A significant written report must be submitted as part of this component.
3. A significant teaching experience under the direct supervision of a faculty member in ORIE using ORIE 4990 Teaching in ORIE.

Procedures

Each program must be approved by the associate director of undergraduate studies, and any changes to a program must be approved by the associate director.

SCIENCE OF EARTH SYSTEMS (SES)

Offered by the Department of Earth and Atmospheric Sciences

Contact: 2124 Snee Hall, 255-5466, www.eas.cornell.edu

The Earth Sciences have never been more critical to society than they are today. Global warming, dwindling energy resources, inadequate water supplies, political strife over strategic minerals, and megadisasters threatened by volcanic eruptions, earthquakes, tsunamis, and hurricanes: these are but a few of the headlines that appear with increasing frequency. The Department of Earth and Atmospheric Sciences at Cornell is a global leader in research directed toward understanding the fundamental processes that have shaped our planet, and is committed to providing Cornell students with the earth literacy needed to serve as informed citizens and wise stewards of the Earth. EAS faculty members and graduate students carry out frontier research on both basic and applied aspects of subjects as diverse as satellite monitoring of volcanic activity, the deep structure of the Andes Mountains and Tibetan Plateau, the nature of the earth's ionosphere, and the impact of aerosols on global climate.

The Science of Earth Systems (SES) major is the undergraduate program offered by EAS to Cornell students in Engineering, Arts and Sciences and the College of Agriculture and Life Sciences. Students in this program can pursue education and research that prepares them to compete for careers or graduate study at leading institutions in this country and abroad. Students may choose to focus on one of a number of disciplinary specialties, such as geophysics or tectonics, or develop the broad expertise needed to understand the interactions between the diverse elements of earth and life in the past, present, and future. By analyzing the complex relations among the ocean, solid earth, atmosphere, and biosphere, students can help meet society's growing demand for energy, minerals, and clean water as well as contribute to mitigating the negative impacts related to global warming, rising sea level, natural hazards, and decreasing biodiversity.

The SES program is intrinsically interdisciplinary, involving many branches of science and engineering. Examples of the latter include civil and environmental engineering, biological and environmental engineering, mechanical and aerospace engineering, and electrical and computer engineering. The SES program is unique in that it incorporates the fundamentals of Earth Science with the emergence of a new and more complete approach that encompasses all components of the earth system—air, life, rock, and water—to gain a new and more comprehensive understanding of the world as we know it.

To achieve a complete understanding of these important issues, students must have a desire to take a very hands-on approach. An abundance of opportunities exists for

geological, oceanographic, and meteorological research in the field and for nationwide and international travel as well as paid research experience. Students have worked with faculty members in the Andes, the Aleutians, the Rocky Mountains, the Atacama Desert, the Caribbean, Tibet, and Hawaii, and have spent a semester at sea in the Woods Hole Ocean Studies Program. Students are also able to probe the ionosphere of Earth and the surface of Mars by utilizing techniques in remote sensing.

The SES major provides a strong preparation for graduate school in any one of the earth sciences, such as atmospheric sciences, geological sciences, geophysics, geochemistry, oceanography, hydrology, and biogeochemistry. Students seeking employment with the B.S. degree will have many options in a wide variety of careers related to energy, the environment, and critical resources in both the private sector and government. Students with the strong science background provided by the SES major are also highly valued by graduate programs in environmental law, public affairs, economics, and public policy.

Requirements for the Major

1. Basic Math and Sciences

This part of the SES curriculum builds a strong and diverse knowledge of fundamental science and mathematics, providing the student with the basic tools needed in upper-level science classes.

- MATH 1910–1920 (or MATH 2930–2940)
- PHYS 1112–2213
- CHEM 2090–2080 or 1570
- BIOL—three options:
 - one year of biology, choosing from the introductory biology sequences of courses: BIOG 1101/1103–1102/1104, or 1105/1106, or BIOG 1109/1110
 - one semester from the introductory biology sequences of courses (listed in option 1) and EAS/BIOEE 1540 or EAS 1700
 - students may substitute (with written permission of their advisor) one semester of biology with an additional semester of chemistry, math, or physics.

2. A required introductory course in earth science is satisfied by EAS 2200

3. SES Core Courses

The core courses emphasize the interconnectedness of the Earth system and are founded on the most modern views of the planet as an interactive and ever-changing system. Each crosses the traditional boundaries of disciplinary science. The major requires three of the following four core courses.

- EAS 3010 Evolution of the Earth System
- EAS 3030 Biogeochemistry
- EAS 3040 Interior of the Earth
- EAS 3050 Climate Dynamics

4. Concentration Courses

The concentration is achieved by completion of four intermediate to advanced-level courses (3000 level and up) that build on the core courses and have prerequisites in the required

basic sciences and mathematics courses. Note that additional basic math and science courses may be required to complete the concentration courses, depending upon the student's choice of concentration. The concentration courses build depth and provide the student with a specific expertise in some facet of Earth system science. Four defined areas of specialization include geological sciences, biogeochemistry, atmospheric sciences, and ocean sciences. Students may also design other concentrations. Examples include planetary science, ecological systems, geohydrology, and soil science. The concentration should be chosen during the junior year or before in consultation with the student's advisor and with approval of the director of undergraduate studies. For concentrations beyond the four first named, approval by the SES Curriculum Committee is needed.

5. Field/Observational/Laboratory Experience

Exposure to the basic observations of earth science, whether directly in the out-of-doors, or indirectly by the many advanced techniques of remote sensing of our planet, or in the laboratory, is necessary to understand fully the chosen area of concentration in the major. Three credits of appropriate course work are required. Possibilities include the following:

Courses in the Hawaii Environmental Semester Program; or

Courses given by the Shoals Marine Laboratory; or

EAS 2500 Meteorological Observations and Instruments; or

EAS 3520 Synoptic Meteorology I; or

EAS 4170 Field Mapping in Argentina

EAS 4370 Geophysical Field Methods; or

EAS 4910 and/or EAS 4920 Undergraduate Research with appropriate choice of project; or

Field course or courses taught by another college or university (e.g. Semester at Sea).

Students should discuss with their faculty advisor whether the fourth core course listed above or the course used to fulfill the observation/field requirement may also be used to satisfy the concentration.

For more information contact Professor John Cisne, Department of Earth and Atmospheric Sciences, john.cisne@cornell.edu, or visit www.eas.cornell.edu.

Field Study in Hawaii

Field study is a fundamental aspect of earth system science. Students wishing to increase their field experience may fulfill some of the requirements for the Science of Earth Systems major by off-campus study through the Cornell Earth and Environmental Semester program (EES). The EES program, offered during the spring semester, emphasizes field-based education and research. It is based on the island of Hawaii, an outstanding natural laboratory for earth and environmental sciences. Courses that may be applied to the Science of Earth Systems major include EAS 3400, 3220, and 3510. The EES program also offers opportunities for internships with various academic, nonprofit, and government organizations. Typically, students participate in

the EES program during their junior year, although exceptions are possible. For further information, see www.geo.cornell.edu/geology/classes/hawaii.

Science of Earth Systems Honors Program

The B.S. degree with honors is granted to engineering students who satisfy the requirements given at the beginning of the section "Engineering Majors" as well as the requirements of an honors thesis involving research (EAS 4910–4920 or 4990, 2 or more credits each) of breadth, depth, and quality. A written proposal of the honors project must be accepted by the student's advisor and the director of undergraduate studies early in the first semester of the student's senior year.

ENGINEERING MINORS

Students may pursue minors in any department in any college that offers them, subject to limitations placed by the department offering the minor or by the students' major. Completed minors will appear on the student's transcript. Not all departments offer minors. Consult the appropriate section in *Courses of Study* or contact the appropriate department for information on minors offered and how to pursue a minor.

An engineering minor recognizes formal study of a particular subject area in engineering normally outside the major. Students undertaking a minor are expected to complete the requirements during the time of their continuous undergraduate enrollment at Cornell. Completing the requirements for an engineering minor (along with a major) may require more than the traditional eight semesters at Cornell. However, courses that fulfill minor requirements may also satisfy other degree requirements (e.g., distribution courses, advisor-approved, or major-approved electives), and completion within eight semesters is possible.

An engineering minor requires:

- successful completion of all requirements for an undergraduate degree.
- enrollment in a major that approves participation in the minor.
- satisfactory completion of six courses (at least 18 credits) in a college-approved minor.

Students may apply for certification of a minor at any time after the required course work has been completed in accordance with published standards. An official notation of certification of a minor appears on the Cornell transcript following graduation.

The College of Engineering offers minors in the following areas (offering units are indicated in parentheses):

- Aerospace Engineering (MAE)
- Applied Mathematics (TAM)
- Biological Engineering (BEE)
- Biomedical Engineering (BME)
- Civil Infrastructure (CEE)
- Computer Science (CS)
- Electrical and Computer Engineering (ECE)
- Engineering Management (CEM)

Engineering Statistics (ORIE)
 Environmental Engineering (BEE/CEE)
 Science of Earth Systems (EAS)
 Game Design (CS)
 Industrial Systems and Information Technology (ORIE)

Information Science (INFO)
 Materials Science and Engineering (MSE)
 Mechanical Engineering (MAE)

Operations Research and Management Science (ORIE)

Additional information on specific minors can be found below, in the *Engineering Undergraduate Handbook*, in the undergraduate major office of the department or school offering the minor, and in Engineering Advising.

MINOR: AEROSPACE ENGINEERING

Offered by: Sibley School of Mechanical and Aerospace Engineering

Contact: 108 Upson Hall, 255-3573, www.mae.cornell.edu

Students intending to earn this minor should seek advice and pre-approval of their minor academic program from the associate director for undergraduate affairs in Mechanical Engineering before taking courses toward the minor.

The aerospace engineering minor develops the engineering analysis and design skills necessary for creating and understanding aerospace vehicles and their subsystems. The minor includes diverse topics relevant to applications both in the earth's atmosphere (e.g., aerodynamics) and in space (e.g., spacecraft thermal systems or orbital mechanics). Students in this minor will take at least four core aerospace courses, along with up to two supporting courses in engineering fundamentals or courses with applicability to aeronautics and spacecraft.

Academic Standards: A grade of at least C- in each course. If a course is offered only S-U, a grade of S is acceptable.

Requirements:

Six courses from the lists below, each worth at least 3 credits, must be completed. No substitutions will be accepted from other departments at Cornell or elsewhere.

Rules for selecting courses:

- Rules for ME majors:
 - Select at least four courses from group A, of which you must choose MAE 3050 or MAE 3060 (or both).
 - Select at most two courses from group B. No courses from group C may be used.
 - Use at most four courses to satisfy both the Aerospace Minor requirements and the BSME degree requirements. The major concentration courses may not be among these overlapped courses.
- Rules for other majors:
 - Select least four courses from group A, of which you must choose MAE 3050 or MAE 3060 (or both).

- Select a total of at most two courses from group B and group C.
- Do not use any courses to satisfy requirements of both the Mechanical Engineering Minor and the Aerospace Engineering Minor.

Group A: Core Aerospace Engineering

MAE 3050 Intro to Aeronautics
 MAE 3060 Spacecraft Engineering
 MAE/ECE 4150 GPS: Theory and Design
 *MAE 4291 Supervised Senior Design Experience, with Aerospace Focus or MAE 4900 Special Investigations in Mechanical and Aerospace Engineering, with Aerospace Focus
 MAE 4230/5230 Intermediate Fluid Dynamics
 MAE 5060 Aerospace Propulsion Systems
 MAE 5070 Dynamics of Flight Vehicles
 *MAE 4291 and 4900 require a form signed by the project advisor, stating that the project focuses on aerospace and is suitable as a core aerospace course for the minor. MAE 4291 or 4900 must be worth 3 credits or more. Students are restricted to at most one MAE 4291 OR one MAE 4900 counting toward the minor (may not count both MAE 4291 and MAE 4900 toward the minor).

Group B: Courses Applicable to Aerospace Engineering

MAE 4170/5170 Introduction to Robotics: Dynamics, Control, Design
 MAE 4550/CEE 4770/MSE 5550/TAM 4550 Introduction to Composite Materials
 MAE 4700/5700 Finite Element Analysis for Mechanical and Aerospace Design or CEE 4720 Introduction to the Finite Element Method
 MAE 4770/5770 Engineering Vibrations
 MAE 4780/5780/CHEME 4720/ECE 4720 Feedback Control Systems
 MAE 5430 Combustion Processes
 MAE 5710 Applied Dynamics or TAM 5700 Intermediate Dynamics

Group C: Fundamentals

ENGRD 2020
 ENGRD 2030
 MAE 2120
 ENGRD/MAE 2210
 MAE 3230
 MAE 3240
 MAE 3250
 MAE 3260
 MAE 3780 or ECE 2100/ENGRD 2100 or PHYS 3360

MINOR: APPLIED MATHEMATICS

Offered jointly by the Department of Theoretical and Applied Mechanics and Department of Mathematics

Contact: Richard Rand, 207 Kimball Hall, 255-7145, thr2@cornell.edu, www.tam.cornell.edu/ undergraduate

All Engineering undergraduates affiliated with all Engineering majors are eligible to participate in this minor.

Academic standards: At least C in each course in the minor.

Requirements

At least six courses beyond MATH 2940, to be chosen as follows:

- At most one course from any one of the groups 1, 2, 3, or 4.
- At least three courses from groups 5 and 6.
- At most one 2000-level course.
- At most one course that is offered by the student's major department.

1. Analysis

AEP 3210 Mathematical Physics I
 MATH 3230 Introduction to Differential Equations
 MATH 4200 Differential Equations and Dynamical Systems
 TAM 3100 Introduction to Applied Mathematics I

2. Computational Methods

CS 4210 Numerical Analysis and Differential Equations
 ENGRD 3200 Engineering Computation
 ENGRD 3220 Introduction to Scientific Computation
 ORIE 3300 Optimization I

3. Probability and Statistics

CEE 3040 Uncertainty Analysis in Engineering
 ECE 3100 Introduction to Probability and Random Signals
 ENGRD 2700 Basic Engineering Probability and Statistics
 MATH 4710 Basic Probability
 ORIE 3500 Engineering Probability and Statistics II

4. Applications

AEP 3330 Mechanics of Particles and Solid Bodies
 CEE 3310 Fluid Mechanics
 CEE 3710 Structural Modeling and Behavior
 CHEME 3230 Fluid Mechanics
 CS 2800 Discrete Structures
 CS 2850 Networks
 ECE 3200 Networks and Systems
 ECE 4250 Digital Signal Processing
 MAE 3230 Introductory Fluid Mechanics
 MSE 3030 Thermodynamics of Condensed Systems

5. Advanced courses

Only one of these three may be chosen:
 AEP 3220 Mathematical Physics II
 MATH 4220 Applied Complex Analysis
 TAM 3110 Introduction to Applied Mathematics II

Only one of the following two may be chosen:

ECE 4110 Random Signals in Communications and Signal Processing

ORIE 3510 Introductory Engineering Stochastic Processes I

Only one of the following two may be chosen:

MAE 5710 Applied Dynamics

TAM 5700 Intermediate Dynamics

Also, you may choose from:

CS 3810 Introduction to Theory of Computing

CS 4820 Introduction to the Analysis of Algorithms

ORIE 3310 Optimization II

ORIE 4330 Discrete Models

ORIE 4350 Introduction to Game Theory

ORIE 4520 Introductory Engineering Stochastic Processes II

ORIE 5600 Financial Engineering with Stochastic Calculus I

ORIE 5610 Financial Engineering with Stochastic Calculus II

TAM 5780 Nonlinear Dynamics and Chaos

TAM 6100 Methods of Applied Mathematics I

TAM 6110 Methods of Applied Mathematics II

6. Mathematics courses

Any 3000+ level course offered by the Mathematics Department in algebra, analysis, probability/statistics, geometry, or logic, with the following exceptions:

- MATH 3230 or 4200, if any course from group 1 is chosen
- MATH 4710, if any course from group 3 is chosen
- MATH 4220, if TAM 3110 or AEP 3220 is chosen from group 5
- Only one of the following may be chosen:

MATH 3320 Algebra and Number Theory

MATH 3360 Applicable Algebra

MINOR: BIOLOGICAL ENGINEERING

Offered by the Department of Biological and Environmental Engineering

Contact: 207 Riley-Robb Hall, 255-2173, www.bee.cornell.edu

Students in all majors except biological engineering may participate. Students should meet with the BE coordinator as soon as they decide to pursue the minor and before their senior year. They will work with a BEE faculty advisor, who will assist them in completing their minor.

Educational objectives of the minor:

Biological engineering is the application of engineering to living systems. Examples of engineering efforts in this field include the development of new biosensor technologies, study and control of biologically based matter transformation systems, and development of

engineered devices to study and regulate fundamental biological processes. The biological engineering minor is an opportunity for students to further their understanding of living systems and to increase their knowledge of the basic transport processes that occur within these systems. Courses in the minor provide opportunities to analyze and manipulate living systems at the molecular, cellular, and system levels.

Academic standards: At least C– in each course in the minor and a GPA ≥ 2.0 in all courses in the minor

Requirements

At least six courses (≥ 18 credits), with at least three courses and 9 credits taught in BEE as follows:

I. Biology Foundation (at least one but no more than two courses)

BIOBM 3300 or 3310–3320 Biochemistry

BIOMI 2900 Microbiology

BIONB 2220 Neurobiology

II. Biological Engineering Core (at least one but no more than two courses)

BEE 2600 Principles of Biological Engineering

BEE 3500 Biological and Environmental Transport Processes

BEE 3600 Molecular and Cellular Bioengineering

BEE 3310 Bio-fluid Mechanics

III. Biological Engineering Concentration Electives (minimum of 3 courses)

Choose any three courses from the concentration lists below. Courses appearing in more than one concentration do not double count. BEE 3600 may be taken as either a concentration elective or a core course.

Biomedical Engineering Concentration

AEP 4700 Biophysical Methods (also BIONB 4700)

BEE 3600 Molecular and Cellular Bioengineering (also BME 3600)

BEE 3650 Properties of Biological Materials

BEE 4500 Bioinstrumentation

BEE 4530 Computer-Aided Engineering: Applications to Biomedical Processes (also MAE 4530)

BEE 4540 Physiological Engineering

BEE 4590 Biosensors and Bioanalytical Techniques

BME 3300 Introduction to Computational Neurosciences (also BIONB/PSYCH/COGST 3300)

BME 4040 Biomedical System Design (also ECE 4020)

BME 5390 Biomedical Materials and Devices for Human Body Repair (also FSAD 4390)

BME 5650 Biomechanical Systems—Analysis and Design (also MAE 5650)

CHEME 4810 Biomedical Engineering (also BME 4810)

ECE 5780 Computer Analysis of Biomedical Images

MAE 4630 Neuromuscular Biomechanics (also BME 4630)

MAE 4640 Orthopaedic Tissue Mechanics

MSE 4610 Biomedical Materials and Their Applications

Bioprocess Engineering Concentration

BEE 3600 Molecular and Cellular Bioengineering (also BME 3600)

BEE 4500 Bioinstrumentation

BEE 4530 Computer Aided Engineering: Applications to Biomedical Processes (also MAE 4530)

BEE 4590 Biosensors and Bioanalytical Techniques

BEE 4640 Bioseparation Processes

BEE 4840 Metabolic Engineering

CHEM 3000 Quantitative Chemistry (does not count for Engineering credit)

CHEME 3320 Analysis of Separation Processes

CHEME 5430 Biomolecular Engineering of Bioprocesses

Bioenvironmental Engineering Concentration

BEE 3710 Physical Hydrology for Ecosystems

BEE 4010 Renewable Energy Systems

BEE 4350 Principles of Aquaculture

BEE 4710 Introduction to Groundwater (also EAS 4710)

BEE 4730 Watershed Engineering

BEE 4870 Sustainable Energy Systems

BEE 6510 Bioremediation Engineering: Organisms to Clean up the Environment

CEE 4510 Microbiology for Environmental Engineering

CEE 4520 Water Supply Engineering

MINOR: BIOMEDICAL ENGINEERING

Offered by the Department of Biomedical Engineering (BME)

Contact: Carol Casler, 120 Olin Hall, 255-1489, www.bme.cornell.edu/academics/undergraduate/biomedminor.cfm

All undergraduates are eligible to participate in this minor, but they may participate in only one of the biological engineering and the biomedical engineering minors.

Educational Objectives: Biomedical engineering is the application of engineering principles and methods to a wide array of problems associated with human health. The discipline includes the design of biocompatible materials, prostheses, surgical implants, artificial organs, controlled drug-delivery systems, and wound closure devices. Diagnosing diseases and determining their biological origins depend upon increasingly sophisticated instrumentation and the use of mathematical models. This minor allows students to gain exposure to the breadth and depth of biomedical engineering offerings at Cornell, to prepare for advanced studies in biomedical engineering, and to obtain transcript recognition for their interest and capability in this rapidly growing area.

Students are asked to complete a form declaring their interest in the minor with the biomedical engineering undergraduate minor coordinator in 120 Olin Hall. On the form you will be asked to choose a BME faculty advisor that you can consult about the BME minor plan.

Academic standards: At least C- in each course in the minor. A cumulative GPA \geq 2.0 for all courses in the minor.

Requirements

The 1-credit bioengineering seminar as well as at least six courses (\geq 18 credits) from the five categories listed below; two course groups need to be in categories 1. Introductory biology and/or 2. Advanced biology with no more than one course from category 1. Four courses must come from the following categories: 3. Molecular and cellular biological engineering, 4. Biomedical engineering analysis of physiological systems, and 5. Biomedical engineering applications with courses from at least two of these categories represented. At least four of the six courses must not be specifically required major degree courses or cross-listings.

Required course: BEE/BME 5010
Bioengineering Seminar (1 credit, 1 semester)

Category 1. Introductory biology (maximum of 4 credits and one course grouping toward the BME minor)

A score of 5 on (CEEB) Advanced Placement Biology

A score of 4 on (CEEB) Advanced Placement Biology and ENGR 1310: Introduction to Biomedical Engineering

A score of 4 on (CEEB) Advanced Placement Biology and BIOG 1103 or BIOG 1104 Biological Sciences, Laboratory

BIOG 1101, 1102, 1103, and 1104 Biological Sciences

BIOG 1105 and 1106 Introductory Biology

BIOG 1107 and 1108 General Biology

BIOG 1110 Biological Principles and ENGR 1310 Introduction to Biomedical Engineering

Category 2. Advanced biology

BIOAP 3110/VTBMS 3460 Introductory Animal Physiology Lectures

BIOBM 3300 Principles of Biochemistry, Individualized Instruction

BIOBM 3310 Principles of Biochemistry, Proteins and Metabolism

BIOBM 3320 Principles of Biochemistry, Molecular Biology

BIOBM 3330 Principles of Biochemistry, Proteins, Metabolism, and Molecular Biology

BIOGD 2810 Genetics

BIONB 2220 Neurobiology and Behavior II: Introduction to Neurobiology

BIOMI 2900 General Microbiology Lectures

Category 3. Molecular and cellular biomedical engineering

AEP 2520/ENGRD 2520 The Physics of Life

BEE 3600/BME 3600 Molecular and Cellular Bioengineering

BME 3010/CHEME 4010* Molecular Principles of Biomedical Engineering

BME 3020/CHEME 4020* Cellular Principles of Biomedical Engineering

Category 4. BME analysis of physiological systems

BEE 4540 Physiological Engineering

BIONB 3300/BME 3300/COGST 3300/PSYCH 3300 Introduction to Computational Neuroscience

BIONB 4910/BME 4910 Principles of Neurophysiology

BME 4010/MAE 4660* Biomedical Engineering of Metabolic and Structural Systems

BME 4020* Electrical and Chemical Physiology

CHEME 4810/BME 4810 Biomedical Engineering

MAE 4640/BME 4640 Orthopaedic Tissue Mechanics

Category 5. Biomedical engineering applications

AEP 4700/BIONB 4700/BME 5700 Biophysical Methods

BEE 3650 Properties of Biological Materials

BEE 4500 Bioinstrumentation

BEE 4530/MAE 4530 Computer-Aided Engineering: Applications to Biomedical Processes

BEE 5400 Biomedical Computation

BEE 4590 Biosensors and Bioanalytical Techniques

BEE 5830 Cell-Biomaterials Interactions

BME 4110 Science and Technology Approaches to Problems in Human Health

BEE 5600 Biotransport and Drug Delivery

BME 5810/MAE 5680 Soft Tissue Biomechanics

CS 3510/BIOBM 3510/ENGRD 3510 Numerical Methods in Computational Molecular Biology

ECE 5020/BME 5020 Biomedical System Design

ECE 5780/BME 5780 Computer Analysis of Biomedical Images

MSE 4610 Biological Materials and Their Applications

MSE 5620/BME 5620 Biomineralization: The Formation and Properties of Inorganic Biomaterials

FSAD 4390/BME 5390 Biomedical Materials and Devices for Human Body Repair

*Students interested in professional practice as biomedical engineers should consider an M.Eng. degree in BME. The recommended sequence for admission is as follows: two courses from categories 1 and 2, BME 3010, 3020, 4010, and 4020. The program requires students to have a knowledge of molecular and cellular biomedical engineering, and of biomedical engineering analysis of physiological systems.

MINOR: CIVIL INFRASTRUCTURE

Offered by the School of Civil and Environmental Engineering

Contact: 221 Hollister Hall, 255-3412, www.cee.cornell.edu

Students affiliated with all majors except civil engineering may participate in this minor.

The minor in civil infrastructure is intended to introduce undergraduates to the engineering methodologies of mechanics, materials, analysis, design, and construction and to show how these are used in solving problems in the development, maintenance, and operation of the built environment that is vital for any modern economy.

Academic standards: At least C in each course in the minor

Requirements

At least six courses (\geq 18 credits), chosen as follows:

1. Required course: ENGRD 2020 Mechanics of Solids
2. Additional courses: choose any five (groupings are for information only)*

Geotechnical engineering

CEE 3410 Introduction to Geotechnical Engineering

CEE 4400 Foundation Engineering

CEE 4410 Retaining Structures and Slopes

CEE 4440 Environmental Site and Remediation Engineering

Structural engineering

CEE 3710 Structural Modeling and Behavior

CEE 3720 Intermediate Solid Mechanics

CEE 4710 Fundamentals of Structural Mechanics

CEE 4720 Introduction to the Finite Element Method

CEE 4730 Design of Concrete Structures

CEE 4740 Introduction to the Behavior of Metal Structures

CEE 4780 Structural Dynamics and Earthquake Engineering

Other related courses

CEE 5950 Construction Planning and Operations

*Other CEE courses may be approved by petition in advance

MINOR: COMPUTER SCIENCE

Offered by the Department of Computer Science

Contact: 303 Upson Hall, 255-0982, www.cs.cornell.edu

Students affiliated with all majors except Computer Science are eligible to participate in this minor. This minor is for students who anticipate that computer science will play a prominent role in their academic and professional career.

Academic standards: At least C in each course in the minor.

Requirements

At least six courses (18 credits) chosen as follows:

1. Required courses
CS/ENGRD 2110 Computers and Programming
- One of the following:
CS 3410 Systems Programming, or
CS 3420/ECE 3140 Computer Organization
2. Additional courses
Four CS courses numbered 3000 or higher with the following exceptions:
CS 4999 and seminars are excluded
CS 2800 is allowed

Cross-listed courses cannot be applied to the minor unless taken under the CS rubric, with the sole exception of ECE 3140 and CS courses also listed as ENGRD. All qualifying courses must be taken at Cornell for a letter grade. No substitutions allowed.

MINOR: ELECTRICAL AND COMPUTER ENGINEERING

Offered by the School of Electrical and Computer Engineering

Contact: 223 Phillips Hall, 255-4309, www.ece.cornell.edu

Students affiliated with all majors except Electrical and Computer Engineering are eligible to participate in this minor.

This minor offers the opportunity to study analog and digital circuits, signals and systems, and electromagnetics and to concentrate at higher levels in one of several different areas such as circuit design, electronic devices, communications, computer engineering, networks, and space engineering.

Academic standards: At least C– in each course in the minor. GPA ≥ 2.3 for all courses in the minor.

Requirements

At least six courses (≥ 18 credits), chosen as follows:

1. Two of the following:
ECE/ENGRD 2100 Introduction to Circuits for Electrical and Computer Engineers
ECE 2200 Signals and Information
ECE/ENGRD 2300 Introduction to Digital Logic Design
2. Two of the following:
ECE 3030 Electromagnetic Fields and Waves
ECE/ENGRD 3100 Introduction to Probability and Random Signals
ECE 3140/CS 3420 Computer Organization or CS 3410 Systems Programming
ECE 3150 Introduction to Microelectronics
3. One other non-project ECE course at the 3000 level or above (3-credit minimum)
4. One other non-project ECE course at the 4000 level or above (3-credit minimum)

MINOR: ENGINEERING MANAGEMENT

Offered by the School of Civil and Environmental Engineering

Contact: 221 Hollister Hall, 255-3412, www.cee.cornell.edu

Students affiliated with all majors are eligible to participate in this minor. CEE students may not use courses simultaneously to satisfy a requirement for the minor and as a major-approved elective or design elective. ORE students have some specific restrictions and requirements as noted below.

This minor focuses on giving students a basic understanding of engineering economics, accounting, statistics, project management methods, and analysis tools necessary to manage technical operations and projects effectively. The minor provides an important set of collateral skills for students in any engineering discipline.

Academic standards: At least C in each course in the minor.

Requirements

At least six courses (≥ 18 credits), chosen as follows:

1. Required courses (3):
CEE 3230 Engineering Economics and Management
or ORIE 4150 Economic Analysis of Engineering Systems
ORIE 3150 Financial and Managerial Accounting¹
CEE 3040 Uncertainty Analysis in Engineering²
or ENGRD 2700 Basic Engineering Probability and Statistics
or ECE 3100 Introduction to Probability and Random Signals
2. Additional courses—choose any three³
CEE 4060 Civil Infrastructure Systems
CEE 4920 Engineers for a Sustainable World: Engineering in International Development
CEE 5930 Engineering Management Methods⁴
CEE 5950 Construction Planning and Operations
CEE 5970 Risk Analysis and Management
NBA 5070 Entrepreneurship for Scientists and Engineers
or MAE/ENGRG 4610/ORIE 4152 Entrepreneurship for Engineers
or BEE 4890 Engineering Entrepreneurship, Management and Ethics

¹ORIE students must substitute NCC 5560 or NBA 5000 for ORIE 3500

²TAM 3100 cannot be substituted for CEE 3040

³Other courses approved by petition in advance

⁴This course is not accepted for ORIE students

MINOR: ENGINEERING STATISTICS

Offered by the School of Operations Research and Information Engineering

Contact: 203 Rhodes Hall, 255-5088, www.orie.cornell.edu

Students affiliated with all majors except Operations Research and Engineering are eligible to participate in this minor.

The goal of the minor is to provide the student with a firm understanding of statistical principles and engineering applications and the ability to apply this knowledge in real-world situations.

Academic standards: At least C– in each course in the minor. GPA ≥ 2.0 for all courses in the minor.

Requirements

At least six courses (≥ 18 credits), chosen as follows:

1. Required courses:
ENGRD 2700 Basic Engineering Probability and Statistics
ORIE 3500 Basic Engineering Probability and Statistics II *or* ECE 3100 Introduction to Probability and Random Signals
2. Four of these (≥ 11 credits)*:
ORIE 3510 Introductory Engineering Stochastic Processes I *or* ECE 4110 Random Signals in Communications/Signal Processing
ORIE 4580 Simulation Modeling and Analysis
ORIE 4710 Applied Linear Statistical Models
ORIE 4711 Experimental Design
ORIE 4712 Regression
ORIE 5550 Applied Time Series Analysis
ORIE 5770 Quality Control
MATH 4720 Basic Probability *or* BTRY 4090 Theory of Statistics
BTRY 6020 Statistical Methods II
BTRY 6030 Statistical Methods III *or* ILRST 4110 Statistical Analysis of Qualitative Data
ILRST 3100 Statistical Sampling
ILRST 4100 Techniques of Multivariate Analysis

*Other course options approved by petition in advance. Some of these courses require others as prerequisites. All these courses are cross-listed under the Department of Statistical Science.

MINOR: ENVIRONMENTAL ENGINEERING

Offered jointly by the Department of Biological and Environmental Engineering and the School of Civil and Environmental Engineering

Contact: 207 Riley-Robb Hall, 607 255-2173, www.bee.cornell.edu, or 221 Hollister Hall, 607 255-3412, www.cee.cornell.edu

Students affiliated with all majors except environmental engineering are eligible to participate in this minor. Civil engineering

majors may not use courses simultaneously to satisfy a requirement for the minor and as a major-approved elective or design elective.

A fundamental challenge for the engineering profession is development of a sustainable society and environmentally responsible industry and agriculture reflecting an integration of economic and environmental objectives. We are called upon to be trustees and managers of our nation's resources, the air in our cities, and water in our aquifers, streams, estuaries, and coastal areas. This minor encourages engineering students to learn about the scientific, engineering, and economic foundations of environmental engineering so that they are better able to address environmental management issues.

Academic standards: At least C- in each course in the minor. GPA \geq 2.0 for all courses in the minor.

Requirements

At least six courses (\geq 18 credits), chosen from the following groups, with at least one course from each group.

Group A. Environmental engineering processes:

- BEE/ENGRD 2510 Engineering for a Sustainable Society
- CEE 3510 Environmental Quality Engineering
- CEE 4510 Microbiology for Environmental Engineering
- CEE 4520 Water Supply Engineering
- CEE 4530 Laboratory Research in Environmental Engineering
- CEE 4540 Sustainable Small-Scale Water Supplies
- CEE 4550 AguaClara: Sustainable Water Supply Project
- BEE 4760 Solid Waste Engineering
- CEE 4440 Environmental Site and Remediation Engineering
- BEE/EAS 4800 Our Changing Atmosphere: Global Change and Atmospheric Chemistry
- CEE 4920 Engineers for a Sustainable World
- BEE 6510 Bioremediation
- CEE 6530 Water Chemistry for Environmental Engineering
- CEE 6560 Physical/Chemical Process
- CEE 6570 Biological Processes
- CEE 6580 Biodegradation and Biocatalysis

Group B. Environmental systems

- ENGR/CEE 1130* Sustainable Design for Appledore Island (*may count only if taken before the junior year)
- BEE 4750 Environmental Systems Analysis
- CEE 5970 Risk Analysis and Management
- CEE 6230 Environmental Quality Systems Engineering

Group C. Hydraulics, hydrology, and environmental fluid mechanics

- CEE 3310 Fluid Mechanics (CHEME 3230 or MAE 3230 may be substituted for CEE 3310)
- CEE 3320 Hydraulic Engineering

BEE 3710 Physical Hydrology for Ecosystems

BEE/EAS 4710 Introduction to Groundwater

CEE 4320 Hydrology

CEE 4360 Case Studies in Environmental Fluid Mechanics

CEE 4370 Experimental Methods in Fluid Dynamics

BEE 4730 Watershed Engineering

BEE 4740 Water and Landscape Engineering Applications

CEE 6310 Computational Simulation of Transport in the Environment

CEE 6330 Flow in Porous Media and Groundwater

CEE 6550 Transport, Mixing, and Transformation in the Environment

BEE 6710 Analysis of the Flow of Water and Chemicals in Soils

BEE 6720 Drainage

MINOR: GAME DESIGN

Offered by the Department of Computer Science

See: gdiac.cis.cornell.edu/courses.php

Requirements:

At least six (6) courses (18-credit minimum) chosen as follows:

Required courses: Complete the following two courses:

- CIS 3000 Introduction to Computer Game Design
- CIS 4002 Advanced Projects in Game Design

Additional Courses: Choose four of the following 12 courses:

CS-focused courses:

- CS/ENGRD 2110 Object-Oriented Programming and Data Structures
- CS 4450 Computer Networks
- ARCH 3704/CS 4620 Introduction to Computer Graphics
- CS 4700 Foundations of Artificial Intelligence
- CS 5620 Interactive Computer Graphics
- CS 5643 Physically Based Animation for Computer Graphics

Other courses:

- ART 2730/CIS 5640 (CS 5640 not allowed) Advanced Animation
- COMM 4220 Psychology of Entertainment Media
- ECE 4760 Designing with Microcontrollers
- COMM/INFO 3450 Human-Computer Interaction
- COMM/INFO 4400 Advanced Human-Computer Interaction Design
- COGST 3420/PSYCH 3420/VISST 3422 Human Perception: Applications to Computer Graphics, Art, and Visual Display

Academic standards: at least a letter grade of C is required for each course in the minor

Note: CS majors cannot take courses from the CS-focused list for the Game Design minor.

MINOR: INDUSTRIAL SYSTEMS AND INFORMATION TECHNOLOGY

Offered by the School of Operations Research and Information Engineering

Contact: 203 Rhodes Hall, 255-5088, www.orie.cornell.edu

Students affiliated with all majors except Operations Research and Engineering and Information Science, Systems, and Technology are eligible to participate in this minor.

The aim of this minor is to provide an in-depth education in issues central to the design and analysis of operational systems, and the tools from information technology that have become an integral part of the manufacturing, finance, service, and public health industries. Students will become familiar with the problems, perspectives, and methods found in these fields and be prepared to work with professionals in designing and managing them. That is, rather than providing a comprehensive view of the range of methodological foundations of operations research, this minor is designed to give the student a focused education in application areas closely associated with these techniques.

Academic standards: At least C- in each course in the minor. GPA \geq 2.0 for all courses in the minor.

Requirements

At least six courses (\geq 18 credits), chosen as follows:

1. Required courses:
 - ENGRD 2700 Basic Engineering Probability and Statistics
 - ORIE 3120 Industrial Data and Systems Analysis
 - ORIE 4800 Information Technology
2. The remaining courses chosen from:
 - ORIE 3150 Financial and Managerial Accounting
 - ORIE 3300 Optimization I
 - ORIE 4150 Economic Analysis of Engineering Systems
 - ORIE 4580 Simulation Modeling and Analysis
 - ORIE 4810 Delivering OR Solutions with Information Technology
 - ORIE 4850 Applications of Operations Research and Game Theory to Information Technology
 - ORIE 5100 Design of Manufacturing Systems
 - ORIE 5120 Production Planning and Scheduling Theory and Practice
 - ORIE 5770 Quality Control

MINOR: INFORMATION SCIENCE

Offered by the Department of Computer Science

Contact: Undergraduate Programs Office, 303 Upson Hall, 255-9837, www.infosci.cornell.edu

Students affiliated with any major except Information Science, Systems, and Technology are eligible to participate in this minor.

The interdisciplinary field of information science covers all aspects of digital information. The program has three main areas: information systems, human-centered systems, and social systems. Information systems studies the computer science problems of representing, storing, manipulating, and using digital information. Human-centered systems studies the relationship between humans and information, drawing from human-computer interaction and cognitive science. Social systems examines information in its economic, legal, political, cultural, and social contexts.

The minor has been designed to ensure that students have substantial grounding in all three areas in addition to having a working knowledge of basic probability and statistics necessary for analyzing real-world data.

Academic standards: At least C in all courses for the minor; S–U courses are not allowed. All courses must be taken at Cornell.

Requirements

Note: These requirements apply to students in the College of Engineering. Students who are not in the College of Engineering should refer to the IS minor requirements listed in the CIS section of this publication.

At least six courses (18 credits) chosen as follows:

- Statistics: one course (must be ENGRD 2700 or CEE 3040)
- Information Systems: two courses
- Human-Centered Systems: one course
- Social Systems: one course
- Elective: one additional course from either Human-Centered Systems or Social Systems

Statistics

An introductory course that provides a working knowledge of basic probability and statistics and their application to analyzing real-world data.

ENGRD 2700 Basic Engineering Probability and Statistics

CEE 3040 Uncertainty Analysis in Engineering

Information Systems

CS 2110 Object-Oriented Programming and Data Structures*

INFO 2300 Intermediate Design and Programming for the Web*

CIS 3000 Introduction to Computer Game Design

INFO 3300 Data-Driven Web Applications

LING 4424 Computational Linguistics

INFO 4300 Information Retrieval

INFO 4302 Web Information Systems

CS 4320 Introduction to Database Systems

CS 4620 Introduction to Computer Graphics

CS 4700 Foundations of Artificial Intelligence

LING 4474 Introduction to Natural Language Processing

ORIE 4740 Statistical Data Mining I

CS 4780 Machine Learning

ORIE 4800 Information Technology

ORIE 4810 Delivering OR Solutions with Information Technology

ORIE 4850 Applications of Operations Research and Game Theory to Information Technology

CS 5150 Software Engineering

CS 5430 System Security

INFO 5300 Architecture of Large-Scale Information Systems

ECE 5620 Fundamental Information Theory

CS 5780 Empirical Methods in Machine Learning and Data Mining

*Computer Science majors may not use INFO 2300. CS 2110 cannot be used by majors for which it is a required course, e.g., Computer Science (CS) and Operations Research and Information Engineering (ORIE).

Human-centered systems

COGST 1101 Introduction to Cognitive Science

PSYCH 2050 Perception

INFO 2140 Cognitive Psychology

INFO 2450 Communication and Technology

PSYCH 2800 Introduction to Social Psychology

INFO 3400 Psychology of Social Computing

PSYCH 3420 Human Perception: Applications to Computer Graphics, Art, and Visual Display

INFO 3450 Human–Computer Interaction Design

PSYCH 3470 Psychology of Visual Communications

INFO 3650 Technology and Collaboration

PSYCH 3800 Social Cognition

PSYCH 4160 Modeling Perception and Cognition

INFO 4400 Advanced Human-Computer Interaction Design

INFO 4450 Seminar in Computer-Mediated Communication

INFO 4500 Language and Technology

DEA 4700 Applied Ergonomic Methods

Social systems

INFO 2040 Networks

STS 2501 Technology in Society

INFO 2921 Inventing an Information Society

ECON 3010 Microeconomics*

SOC 3040 Social Networks and Social Processes

ECON 3130 Intermediate Microeconomic Theory*

INFO 3200 New Media and Society*

AEM 3220 Internet Strategy

INFO 3490 Media Technologies

INFO 3551 Computers: From the 17th Century to the Dotcom Boom

INFO 3561 Computing Cultures

INFO 3660 History and Theory of Digital Art

ECON 3680 Game Theory*

INFO 3871 The Automatic Lifestyle: Consumer Culture and Technology

STS 4111 Knowledge, Technology, and Property

ECON 4190 Economic Decisions Under Uncertainty

COMM 4280 Communication Law

INFO 4290 Copyright in the Digital Age

ORIE 4350 Introduction to Game Theory*

INFO 4144 Responsive Environments

SOC 4150 Internet and Society*

INFO 4470 Social and Economic Data

INFO 4850 Computational Methods for Complex Networks

ECON 4760 Decision Theory I

ECON 4770 Decision Theory II

HADM 4489 The Law of the Internet and E-Commerce

INFO 5150 Culture, Law, and Politics of the Internet

*Only one of ECON 3010 and 3130 may be taken for IS credit. Only one of ORIE 4350 and ECON 3680 may be taken for IS credit. Only one of INFO 3200 and SOC 4150 can be taken for IS credit.

MINOR: MATERIALS SCIENCE AND ENGINEERING

Offered by the Department of Materials Science and Engineering

Contact: 214 Bard Hall, 255-9159, www.mse.cornell.edu

Students affiliated with all majors except materials science and engineering are eligible to participate in this minor.

Materials properties are the foundation of many engineering disciplines including mechanical, civil, chemical, and electrical engineering. This minor provides students with a fundamental understanding of mechanisms that determine the ultimate performance, properties, and processing characteristics of modern materials.

Academic standards: At least C in each course in the minor.

Requirements

At least six courses (≥ 18 credits), chosen as follows:

1. ENGRD 2610 Mechanical Properties of Materials: From Nanodevices to Superstructures, or ENGRD 2620 Electronic Materials for the Information Age

2. Two of:
 - MSE 2060 Atomic and Molecular Structure of Matter
 - MSE 3010 Materials Chemistry
 - MSE 3030 Thermodynamics of Condensed Systems
 - MSE 3040 Kinetics, Diffusion, and Phase Transformations
 - MSE 3050 Electronic, Magnetic, and Dielectric Properties of Materials
 - MSE 4020 Mechanical Properties of Materials, Processing, and Design
3. Three electives chosen from:
 - Any MSE course at the 3000 level or above.

Selected courses in materials properties and processing (at the 3000 level or above) from AEP, CHEME, CEE, ECE, MAE, PHYS, and CHEM, as approved by the MSE undergraduate major coordinator.

MINOR: MECHANICAL ENGINEERING

Offered by the Sibley School of Mechanical and Aerospace Engineering

Contact: 108 Upson Hall, 255-3573, www.mae.cornell.edu

Students affiliated with all majors except MAE are eligible to participate in this minor. Students intending to earn this minor should seek advice and pre-approval of their minor academic program from the associate director for undergraduate affairs in mechanical engineering before taking courses toward the minor.

Academic standards: At least C- in each course in the minor.

Requirements

At least six courses (≥ 18 credits) from among the following: MAE courses at the 2000 level or above; ENGRD 2020 Mechanics of Solids; ENGRD 2030 Dynamics.

Rules for selecting courses:

1. The selection of courses must satisfy the following three requirements.
 - a. At least two courses must be numbered above 3000.
 - b. At least one course must be either (i) numbered above 5000 or (ii) numbered above 3260 and have as a prerequisite ENGRD 2020, 2030, or a MAE course.
 - c. Each course must be worth at least 3 credits.
2. All courses used to satisfy the MAE minor must be MAE courses, ENGRD 2020 or 2030. No substitutions will be accepted from other departments at Cornell or elsewhere. Transfer credit may not be used to satisfy the MAE minor. MAE 1110 Naval Ship Systems, or MAE 4980 Teaching Experience in Mechanical Engineering, may not be used toward satisfying the M.E. minor.

MINOR: OPERATIONS RESEARCH AND MANAGEMENT SCIENCE

Offered by the School of Operations Research and Information Engineering

Contact: 203 Rhodes Hall, 255-5088, www.orie.cornell.edu

Students affiliated with all majors except Operations Research and Engineering and Information Science, Systems, and Technology are eligible to participate in this minor.

Operations research and management science supports decision making through modeling and analysis of complex systems. This understanding is used to predict system behavior and improve system performance. This minor gives the student the opportunity to obtain a wide exposure to the core methodological tools of operations research and management science, including mathematical programming, stochastic and statistical models, and simulation. The intent of this minor is to provide a broad knowledge of the fundamentals, rather than to train the student in a particular application domain. With this preparation, students can adjust their advanced courses and pursue either methodological or application-oriented areas most relevant to their educational goals.

Academic standards: At least C- in each course in the minor. GPA ≥ 2.0 for all courses in the minor.

Requirements

At least six courses (≥ 18 credits), chosen as follows:

1. At least three of these courses:
 - ENGRD 2700 Basic Engineering Probability and Statistics
 - ORIE 3300 Optimization I
 - ORIE 3310 Optimization II
 - ORIE 3500 Engineering Probability and Statistics II
 - ORIE 3510 Introduction to Engineering Stochastic Processes I
 - ORIE 4580 Simulation Modeling and Analysis
2. Any ORIE courses at the 3000 level or higher (including those in 1).

MINOR: SCIENCE OF EARTH SYSTEMS

Offered by the Department of Earth and Atmospheric Sciences

Contact: 2124 Snee Hall, 255-5466, www.eas.cornell.edu

Students affiliated with all majors except science of earth systems are eligible to participate.

Some of the major problems facing mankind in this century involve earth science, especially the generation of new energy sources for a growing world population, and engineers will be challenged to solve these problems. This minor will prepare engineering students to understand the natural operating systems of Earth and the tools and techniques used by earth scientists to understand and monitor these solid and fluid systems.

Academic standards: At least C- in each course in the minor. GPA ≥ 2.0 for all courses in the minor.

Requirements

At least six courses (≥ 18 credits), chosen as follows:

1. EAS 2200 The Earth System
2. At least two of these courses:
 - EAS 3010 Evolution of the Earth System
 - EAS 3030 Introduction to Biogeochemistry
 - EAS 3040 Interior of the Earth
 - EAS 3050 Climate Dynamics
3. Additional EAS courses at the 3000 level or higher to make up the balance of 18 credits. These may include, e.g., additional courses from the above lists, undergraduate research courses, and outdoor field courses.

MASTER OF ENGINEERING DEGREES

The M.Eng. is a professional degree usually completed in two semesters. The curriculum offers advanced training, is practice-oriented, and is designed to assist engineers in development of their professional careers. Completion of the M.Eng. degree requires a design project rather than thesis research. The M.Eng. provides the technical expertise and leadership skills needed in business, government, and industry.

Office of Research and Graduate Studies (RGS), 222 Carpenter Hall, <http://meng.engineering.cornell.edu>.

The following one-year (30-credit) professional master of engineering (M.Eng.) degrees are offered (giving also the administering unit)

M.Eng. (Aerospace Engineering): mechanical and aerospace engineering

M.Eng. (Biological and Environmental Engineering): biological and environmental engineering

M.Eng. (Biomedical Engineering): biomedical engineering

M.Eng. (Chemical Engineering): chemical and biomolecular engineering

M.Eng. (Civil and Environmental Engineering): civil and environmental engineering

M.Eng. (Computer Science): computer science

M.Eng. (Electrical and Computer Engineering): electrical and computer engineering

M.Eng. (Engineering Management): civil and environmental engineering

M.Eng. (Engineering Mechanics): theoretical and applied mechanics

M.Eng. (Engineering Physics): applied and engineering physics

M.Eng. (Geological Sciences): earth and atmospheric sciences

M.Eng. (Materials Science and Engineering): materials science and engineering

M.Eng. (Mechanical Engineering): mechanical and aerospace engineering

M.Eng. (Operations Research and Information Engineering): operations research and information engineering

M.Eng. (Systems Engineering): systems engineering

Many Cornell baccalaureate engineering graduates spend a fifth year at Cornell, earning an M.Eng. degree, although the program is also open to qualified graduates of other schools.

Requirements for admission vary by program. In general, the standard M.Eng. application requirements include

- Statement of purpose
- Complete transcripts from each college or university attended
- At least two letters of recommendation
- Graduate Record Examination (GRE) scores—may not be required by all M. Eng. programs

Many M.Eng. programs waive the GRE requirement and one of the letters of recommendation for students with Cornell Engineering B.S. degrees. Check with the appropriate office for specific program requirements. A list of links and general admission information is posted on <http://meng.engineering.cornell.edu>.

Superior Cornell students who will have between 1 and 8 credits remaining in their last undergraduate semester may petition for early admission to the M.Eng. program. They spend the last semester finishing up their B.S. degree and taking courses that count toward their M.Eng. degree.

Master of Engineering Minors and Concentrations

The following M.Eng. minors and concentrations are offered:

Minors

- bioengineering
- engineering management
- manufacturing
- systems engineering

Concentrations

- applied operations research
- astronautics
- bioinstrumentation/diagnostics
- biomedical materials and mechanics
- complex system development
- data mining and analytical marketing
- drug delivery and cellular/tissue engineering
- dynamics, controls and robotics
- energy and sustainable development
- energy economics and engineering
- engineering mathematics and modeling
- environmental and water resources systems engineering
- environmental fluid mechanics and hydrology
- environmental geophysics
- environmental processes

- financial engineering
- geohydrology
- geotechnical engineering
- information technology
- mechanics of materials
- micro and nanoscale engineering
- nanosystems
- semester in strategic operations
- structural engineering
- technology management for ECE
- thermal-fluidic sciences
- transportation systems engineering

For further information: <http://meng.engineering.cornell.edu>.

Cooperative Program with the Johnson Graduate School of Management

Undergraduates may be interested in a cooperative program at Cornell that leads to both master of engineering and master of business administration (M.B.A.) degrees. With appropriate curriculum planning, such a combined B.S./M.Eng./M.B.A. program can be completed in six years at Cornell, with time out for work experience. For undergraduates from other schools, it may be feasible to complete the M.Eng./M.B.A. program in two years, possibly with an intervening summer or time out for work experience if they do not already have it on coming to Cornell. This accelerated program often incorporates the 12-month M.B.A. program of the Johnson Graduate School of Management (JGSM).

Because 95 percent of the students in the JGSM have work experience, there will typically be a gap for work experience between the M.Eng. and M.B.A. portions of the program for students who do not already have it when beginning the M.Eng. portion.

For further details, visit Engineering Advising (167 Olin Hall), the RGS office (222 Carpenter Hall), the JGSM office in Sage Hall, or the office of your intended undergraduate major.

Lester Knight Scholarship Program

The Lester Knight Scholarship Program is designed to assist and encourage Cornell Engineering students and alumni interested in combining their engineering education with a business degree. The program offers two options or categories of financial support:

- Undergraduate Knight Scholarship
- Alumni Knight Scholarship

Each program has different qualifications and is open to Cornell engineering students and alumni at different stages of their educational or professional career. Participation in the program requires admission by each respective academic program (M.Eng. or M.B.A.) as well as an application to participate in the Knight Scholarship Program.

Contact RGS or refer to the Knight Scholarship web site (www.engr.cornell.edu/knightscholarships) for program specifics.

MASTER OF ENGINEERING (AEROSPACE ENGINEERING)

Offered by the Sibley School of Mechanical and Aerospace Engineering

Contact: 107 Upson Hall, 255-5250, www.mae.cornell.edu

The M.Eng. (Aerospace Engineering) degree program provides a one-year course of study for those who wish to develop a high level of competence in engineering science, current technology, and engineering design.

The program is designed to be flexible so that candidates may concentrate on any of a variety of specialty areas. These include aerodynamics, turbulent flows, nonequilibrium flows, combustion, dynamics and control, computational fluid dynamics, and spacecraft.

A coordinated program of courses for the entire year is agreed upon by the student and the faculty advisor. This program and any subsequent changes must also be approved by the Director of the Master of Engineering program. An individual student's curriculum includes a 4- to 8-credit design/research course, a minimum of 12 credits in aerospace engineering or a closely related field with some technical focus, and sufficient technical electives to meet the total degree requirement of 30 credits (of which at least 28 credits must have letter grades).

Design projects must have an aerospace engineering design or research focus and have the close supervision of a faculty member. The projects may arise from individual faculty and student interests or from collaboration with industry.

All courses must be of true graduate nature. In general, all courses must be beyond the level of those required in an undergraduate engineering program; credit may be granted for an upper-level undergraduate course if the student has done little or no previous work in that subject area, but such courses must have the approval of the Director of the Master of Engineering program.

Check with the MAE graduate field office (107 Upson Hall) for additional degree requirements.

Students enrolled in the M.Eng. (Aerospace Engineering) degree program may take courses that also satisfy the requirements of the bioengineering, engineering management, or systems engineering minors.

MASTER OF ENGINEERING (BIOLOGICAL AND ENVIRONMENTAL ENGINEERING)

Offered by the Department of Biological and Environmental Engineering

Contact: 207 Riley-Robb hall, 255-2173, www.bee.cornell.edu

Educational Goals

The Master of Engineering (M.Eng.) program prepares graduates for professional positions in biological and environmental engineering. The program is flexible, allowing candidates to select their courses and project area to meet their individual goals. In addition to advanced courses in the Department of

Biological and Environmental Engineering, students have access to courses in all fields and programs in the College of Engineering. The M.Eng. program is designed to foster a close student-faculty mentoring relationship. While many students view the M.Eng. as a "fifth and final year" of formal engineering study, it is definitely appropriate and feasible to pursue advanced graduate study following the M.Eng. program if this is desired.

Curriculum Requirements

A total of 30 credits* is required for the master of engineering degree, and the program is usually completed in two semesters. Cornell Engineering undergraduates may apply early and be accepted into the program in their last undergraduate semester if they have 8 or fewer credits remaining in their bachelor's program. All M.Eng. students must complete the following:

- BEE 5951-5952 Master of Engineering Design Project, 3 to 9 credits
- Biological and Environmental Engineering focus courses, 9 credits minimum
- A total of 30 credits* approved by their M.Eng. faculty advisor

Students choose their design project and complete appropriate courses in one of the following areas:

- Bioenergetics and Stress Factors
- Biomechanics
- Controlled-Environment Agriculture
- Energy Systems Engineering
- Engineering to Solve Global Challenges
- Food Process Engineering
- Metabolic Engineering
- Microbial Fuel cells
- Micro-bioreactors
- Molecular Bioengineering
- Nucleic Acid Engineering
- Physiological Engineering
- Soil and Water Engineering

*Detailed requirements are shown on the department web site.

Applicants to the program need to apply directly to the Cornell Grad School at www.gradschool.cornell.edu.

MASTER OF ENGINEERING (BIOMEDICAL ENGINEERING)

Offered by the Department of Biomedical Engineering

Contact: 109 Weill Hall, 255-2573, www.bme.cornell.edu

Our mechanistic understanding of biology has increased rapidly over the past 20 years, and many expect biology to drive engineering and technology in the next 50 years in much the same way that physics drove them in the 20th century. As biology has become more mechanistic, the opportunities to apply engineering approaches have increased enormously. Simultaneously, humanitarian needs and economic opportunities for the application of engineering to improve health

care have increased significantly. Engineers who understand biology and can apply their knowledge and skills to improve human health are increasingly in demand. A professional degree in biomedical engineering will prepare students to fill this increasing critical need.

The breadth and depth of knowledge needed in biomedical engineering makes a four-year B.S. degree program impractical. By combining the M.Eng. (Biomedical Engineering) with a strong B.S. program, a student can obtain the knowledge and skills necessary to be an effective professional biomedical engineer.

Students will acquire an in-depth knowledge of an essential area of biomedical engineering as well as a broad perspective of the biomedical engineering discipline that complements their undergraduate education in engineering or science. Graduates will be equipped to design biomedical devices and develop therapeutic strategies within the bounds of health care economics, the needs of patients and physicians, the regulatory environment for medical devices and pharmaceuticals, and stringent ethical standards.

Students will acquire depth by extending undergraduate concentrations, by selecting one of three areas for concentrated study, and by completing a design project in their area of concentration. The areas are biomedical mechanics and materials; bioinstrumentation/diagnostics; and drug delivery and cellular/tissue engineering. Design projects will be carried out in teams to take advantage of the diversity of student backgrounds and, when possible, projects will be done in collaboration with industrial or clinical partners.

Students from a wide variety of backgrounds in engineering and science are encouraged to apply. They are expected to have completed two semesters of calculus-based physics, at least three semesters of math, starting with calculus, and introductory computer science.

A knowledge of molecular- and cellular-base biomedical engineering and engineering analysis of physiological systems at the level of BME 3010, 3020, 4010, and 4020 is highly recommended. This knowledge can be demonstrated through appropriate undergraduate course work (at least C in each class). Students lacking the appropriate background may need to complete additional courses (beyond the normal 30 credits) to demonstrate appropriate knowledge in these two subject areas.

MASTER OF ENGINEERING (CHEMICAL ENGINEERING)

Offered by the School of Chemical and Biomolecular Engineering

Contact: 358 Olin Hall, 255-4550, www.cheme.cornell.edu

The Master of Engineering (Chemical) is a 30-credit, typically one year, professional program designed to provide the flexibility to increase depth of knowledge in a specialty area, or to broaden students' breadth of knowledge, or to enhance their competitiveness for graduate programs. New "umbrella" program concentrations in "energy economics and engineering" and in "molecular

biotechnology" provide a unique opportunity for a focused interdisciplinary approach in these important career choices. The program includes the option to acquire supervisory training and practice.

Specific requirements include

1. 12 credits in CHEME courses distributed among chemical and biomolecular engineering fundamentals. One required from among CHEME 7110, 7310, and 7510 and the remainder in chemical and biomolecular engineering applications (partial list: CHEME 4800, 4810, 4840, 5200, 5209, 5430, 5720, 6310, 6400, 6610, 6640, and 6650).
2. A minimum of 3 credits of an individual or group project, CHEME 5650.
3. At least 3 credits to demonstrate a knowledge of business practices and techniques for pollution abatement and control. If this knowledge has already been acquired by students as undergraduates, they are exempt from this requirement. If not, a CHEME course (e.g., CHEME 5720 and 6610) or another non-CHEME course covering these topics is required.

MASTER OF ENGINEERING (CIVIL AND ENVIRONMENTAL ENGINEERING)

Offered by the School of Civil and Environmental Engineering

Contact: 219 Hollister Hall, 255-7560, www.cee.cornell.edu

The Master of Engineering degree is a course work and project-oriented program. It is normally completed in two semesters of intensive study. Thirty credit hours are required, consisting of course work in a major concentration and a supporting area, as well as a design project.

Students may focus their studies in one of six major subject areas: environmental and water resource systems engineering, environmental fluid mechanics and hydrology, environmental processes, geotechnical engineering, structural engineering, and transportation systems engineering. Courses in supporting areas come from many disciplines, including architecture, computer science, economics, engineering management, historic preservation, materials science, microbiology and operations research to name just a few.

MASTER OF ENGINEERING (COMPUTER SCIENCE)

Offered by the Department of Computer Science

Contact: 322 Upson Hall, 255-8720, www.cs.cornell.edu/grad/meng

The M.Eng. program in computer science can be started in either the fall or spring semester. This program is designed to develop expertise in system design and implementation in many areas of computer science, including computer networks, Internet architecture, fault-tolerant and secure systems, distributed and parallel computing, high-performance computer architecture, databases and data mining,

multimedia systems, computer vision, computational tools for finance, computational biology (including genomics), software engineering, programming environments, and artificial intelligence.

A typical program includes several upper-division and graduate courses and a faculty-supervised project. The flexible requirements allow students to build up a program that closely matches their interests. Project work, which may be done individually or in a small group, is often associated with ongoing research in the Department of Computer Science in one of the areas listed above, but it can also be done in collaboration with many fields throughout the university.

Cornell seniors may use the early admission option, which allows them to take courses toward their M.Eng. degree while completing their undergraduate degree. The Early Admit option can be started in either the fall or spring semester. It applies only to students who have 1 to 8 credits remaining to complete their undergraduate program. All remaining undergraduate degree requirements must be satisfied by the end of the first semester the student is enrolled in the M.Eng. "early admit" program.

For students with a non-CS background, there is an "extended" program option of four semesters where students use the first two semesters to complete prerequisite courses needed for the more advanced master's-level courses.

MASTER OF ENGINEERING (ELECTRICAL AND COMPUTER ENGINEERING)

Offered by the School of Electrical and Computer Engineering

Contact: Student Services Office, 223 Phillips Hall, 255-8414, www.ece.cornell.edu/aca-meng.cfm

The M.Eng. (Electrical) degree program prepares students either for professional work in Electrical and Computer Engineering and closely related areas or for further graduate study in a doctoral program. The M.Eng. degree differs from the master of science degree mainly in its emphasis on professional skills, engineering design, and analysis skills rather than basic research.

The program requires 30 credits of advanced technical course work beyond that expected in a typical undergraduate program, including at least four graduate-level courses in Electrical and Computer Engineering. The required Electrical and Computer Engineering design project may account for 3 to 8 credits of the M.Eng. program. Occasionally, students take part in very extensive projects and may petition to increase the project component to 10 credits. Students with special career goals, such as engineering management, may apply to use up to 9 credits of approved courses that have significant technical content but are taught in disciplines other than engineering, math, or the physical sciences.

Although admission to the M.Eng. (Electrical and Computer Engineering) program is highly competitive, all well-qualified students are urged to apply. Further information is available at the web site listed above.

MASTER OF ENGINEERING (ENGINEERING MANAGEMENT)

The M.Eng. (Engineering Management) program is designed for engineers who want to stay in a technical environment but advance to managerial roles. Students learn to identify problems, formulate and analyze models to understand these problems, and interpret the results of analyses for managerial action.

A student's program of study is designed individually in consultation with an academic advisor and then submitted to the school's Professional Degree Committee for approval.

For the M.Eng. (Engineering Management) program, the requirements are at least 30 credits of Approved Courses, including:

1. Four core courses: These include CEE 5900 Project Management, CEE 5910 Management Project, CEE 5930 Engineering Management Methods, and CEE 5970 Risk Analysis and Management..
2. Two managerial breadth courses, including one in finance/accounting and one focused on behavior.
3. Three electives.

The School of Civil and Environmental Engineering cooperates with the Johnson Graduate School of Management in a joint program leading to both Master of Engineering and Master of Business Administration degrees. See the beginning of the section "Master of Engineering Degrees."

MASTER OF ENGINEERING (ENGINEERING MECHANICS)

Offered by the Department of Theoretical and Applied Mechanics

Contact: Marcia Sawyer, 107 Upson Hall, 255-5250, www.tam.cornell.edu

This two-semester professional degree program stresses applications of Engineering Mechanics and Applied Mathematics and Modeling. The centerpiece of the program is a project, either single or team-based, on important real-world problems.

Engineering Mechanics: Students in this program will deepen and broaden their knowledge of mechanics as applied to different material systems. The course work centers on additional study of solid mechanics, fracture mechanics, materials and computational methods widely used in industries (e.g., the finite element method). Potential employers are companies interested in computer modeling of mechanical systems and failure and reliability analysis.

Applied Mathematics and Modeling: Students in this program do course work in mathematical modeling and computational methods. They will have great flexibility in their choice of studies. Students who graduate from this program are in a good position to pursue higher degrees or work for financial or informational organizations.

Laboratories: TAM has many laboratories related to research areas and courses of study for the M.Eng. program:

- Ultrasonic and Materials Characterization Laboratory—*Wolfgang Sachse*

- Bio-robotics and Locomotion Laboratory—*Andy Ruina*
- Granular Flow Research Laboratory—*Jim Jenkins*
- Composites Laboratory—*Leigh Phoenix and Petru Petrina*
- Fracture Mechanics Laboratory—*Alan Zehnder*
- Dynamics Laboratory—*Dan Mittler*
- Mechanics of Solids Laboratory—*Dan Mittler*
- Biological Fluid Dynamics Laboratory—*Jane Wang*

Course Work:

(project 10–12 credit hours)

Current Interesting Projects

1. Animal, Human and Robotic Locomotion—*Andy Ruina*
2. Dynamical Systems—*Richard Rand*
3. Stress Rupture Testing of High-Performance Fibers and Yarns—*S. Leigh Phoenix*
4. Mathematics of Finance (capital budgeting, economic analysis Scholes—Black Diffusion Theory)—*K. Bingham Cady*
5. Fracture and Reliability—*Hui, Phoenix, Zehnder*
6. Response Theory—*K. Bingham Cady*
7. Nuclear Reactor Theory—*K. Bingham Cady*
8. Determination of Elastic Constance of Composite Materials Using Ultrasonics—*Wolfgang Sachse*

Engineering Mechanics

Fall semester

Course	Title	Credits
TAM 6630	Solid Mechanics I	4
TAM 5700	Intermediate Dynamics	3
or		
TAM 6100	Methods of Applied Mathematics I	3
TAM 8000	Seminar	1

Spring semester

CEE 7770	Special Topics in Structural Engineering	3
or		
TAM 7130	Fracture	3
TAM 6550	Composite Materials	4
MSE 5820	Mechanical Properties of Material, Processing and Design	4
MAE 5700	Finite Element Analyses for Mechanical and Aerospace Design	4
TAM 8000	Seminar	1

Applied Mathematics and Modeling

Fall semester

TAM 5700	Intermediate Dynamics	3
TAM 6100	Methods of Applied Mathematics I	3

CEE 7710	Stochastic Mechanics in Science and Engineering	3
TAM 8000	Seminar	1
<i>Spring semester</i>		
TAM 5700	Intermediate Dynamics	3
TAM 6110	Methods of Applied Mathematics I	3
TAM 6710	Hamiltonian Dynamics	3
or		
TAM 6740	Nonlinear Vibrations	3
MAE 5700	Finite Element Analyses for Mechanical and Aerospace Design	4
CEE 6720	Introduction to the Finite Element Method	3

MASTER OF ENGINEERING (ENGINEERING PHYSICS)

Offered by the School of Applied and Engineering Physics

Contact: 212 Clark Hall, 255-5198,
www.aep.cornell.edu

The M.Eng. (Engineering Physics) degree may lead directly to employment in engineering design and development or may be a basis for further graduate work. Students have the opportunity to broaden and deepen their preparation in the general field of applied physics, or they may choose the more specific option of preparing for professional engineering work in a particular area such as laser and optical technology, nanostructure science and technology, device physics, materials characterization, or software engineering. Wide latitude is allowed in the choice of the required design project.

Students plan their program in consultation with the program chair. The objective is to provide a combination of a good general background in physics and introductory study in a specific field of applied physics. Candidates may enter with an undergraduate preparation in physics, engineering physics, or engineering. Those who have majored in physics usually seek advanced work with an emphasis on engineering; those who have majored in an engineering discipline generally seek to strengthen their physics base. Candidates coming from industry usually want instruction in both areas. Students granted the degree will have demonstrated competence in an appropriate core of basic physics. If this has not been accomplished before entering the M.Eng. program, undergraduate classes in electricity and magnetism, classical mechanics, and quantum mechanics may be required in addition to the classes taken to satisfy the M. Eng. requirements.

The degree requires 30 credits of graduate-level courses or their equivalent, with at least C- in each course, and distributed as follows:

1. a design project in applied science or engineering with a written final report (6 to 12 credits)
2. an integrated program of graduate-level courses, as discussed below (17 to 23 credits)
3. a required special-topics seminar course (1 credit)

The design project, which is proposed by the student and approved by the program chair, is carried out on an individual basis under the guidance of a member of the university faculty. It may be experimental or theoretical in nature; if it is not experimental, a laboratory physics course is required.

The individual program of study consists of a compatible sequence of courses focused on a specific area of applied physics or engineering. Its purpose is to provide an appropriate combination of physics and physics-related courses (applied math, statistical mechanics, applied quantum mechanics) and engineering electives (e.g., courses in biophysics, chemical engineering, electrical engineering, materials science, computer science, mechanical engineering, or nuclear engineering). Additional science and engineering electives may be included. Some courses at the senior level (4000) are acceptable for credit toward the degree; other undergraduate courses may be required as prerequisites but may not be credited toward the degree.

MASTER OF ENGINEERING (GEOLOGICAL SCIENCES)

Offered by the Department of Earth and Atmospheric Sciences

Contact: 2124 Snee Hall, 255-5466,
www.eas.cornell.edu

The one-year M.Eng. (Geological Sciences) degree program provides future professional geologists or engineers with the geological and engineering background they will need to analyze and solve engineering problems that involve geological variables and concepts. Individual programs are developed within two established options: geohydrology and environmental geophysics.

Incoming students are expected to have a strong background in mathematics, the physical sciences, and chemistry and have a strong interest and substantial background in the geological sciences. The 30-hour M.Eng. program is intended to extend and broaden this background to develop competence in four subject categories. Typical categories for the geohydrology option are porous media flow, geology, geochemistry, and numerical modeling. Typical categories for the environmental geophysics option are geophysics, geology, porous media fluid flow, and computer methods. The courses a student selects in a category will vary depending on the student's background. No courses may be required in some categories, and the categories can be adjusted to the student's interest and needs. Alternatives to numerical modeling in the geohydrology option could be economics or biochemistry, for example. To count toward the 30-credit degree requirement, courses must be at a graduate or advanced undergraduate level.

At least 10 of the 30 hours in the program must involve engineering design. Much of this requirement is normally met through a design project, which can account for over one-third of the program (12 of 30 credits) and must constitute at least 3 credits. The design project must involve a significant geological component and lead to concrete conclusions or recommendations of an engineering nature.

The project topic can be drawn from a student's nonacademic work experience but carried out or further developed with advice from a Cornell faculty member with expertise in the project area selected by the student. A design project in geohydrology would normally involve groundwater flow and mass transport. A design project in environmental geophysics might involve implementation of a field survey using seismological, geoelectrical, or ground-penetrating radar methods to map subsurface stratigraphic or structural features that control groundwater flow or contamination at a site. Projects are presented both in written form and orally in a design seminar at the end of the year.

MASTER OF ENGINEERING (MATERIALS SCIENCE AND ENGINEERING)

Offered by the Department of Materials Science and Engineering

Contact: 214 Bard Hall, 255-9159,
www.mse.cornell.edu

Students who have completed a four-year undergraduate program in engineering or the physical sciences can be considered for admission into the M.Eng. (Materials Science and Engineering) program. This 30-credit program includes course work and a master's design project. The project, which requires individual effort and initiative, is carried out under the supervision of a faculty member. Twelve credits are devoted to the project, which is normally experimental in nature, although computational or theoretical projects are also possible.

Courses for the additional 18 credits are selected from the graduate-level classes in materials science and engineering and from other related engineering fields approved by the faculty. Typically half of the courses are from MSE. One 3-credit technical elective must include advanced math (modeling, computer application, or computer modeling) beyond the MSE undergraduate requirements.

MASTER OF ENGINEERING (MECHANICAL ENGINEERING)

Offered by the Sibley School of Mechanical and Aerospace Engineering

Contact: 107 Upson Hall, 255-5250,
www.mae.cornell.edu

The M.Eng. (Mechanical Engineering) degree program provides a one-year course of study for those who wish to develop a high level of competence in engineering science, current technology, and engineering design.

Candidates may concentrate on any of a variety of specialty areas, including biomechanical engineering, energy systems, combustion, propulsion and power systems, fluid mechanics, heat transfer, materials and manufacturing engineering, and mechanical systems and design.

A coordinated program of courses for the academic year is agreed upon by the student and the faculty advisor. This program and any subsequent changes must also be approved by the Director of the Master of Engineering

program. An individual student's curriculum includes a 4- to 8-credit design/research course, a minimum of 12 credits in mechanical engineering or a closely related field with some technical focus, and sufficient technical electives to meet the total degree requirement of 30 credits (of which at least 28 credits must have letter grades).

The design projects may arise from individual faculty and student interests or from collaboration with industry. All projects must have a mechanical engineering design/research focus and have the close supervision of a faculty member.

All courses must be of true graduate nature. In general, all courses must be beyond the level of those required in an undergraduate engineering program; credit may be granted for an upper-level undergraduate course if the student has done little or no previous work in that subject area, but such courses must have special approval of the Director of the Master of Engineering program.

The technical electives may be courses of appropriate level in engineering, math, physics, chemistry, or biology; a maximum of two courses may be taken in areas other than these if the courses are part of a well-defined program leading to specific professional objectives.

Check with the MAE graduate field office (107 Upson Hall) for additional degree requirements.

Students enrolled in the M.Eng. (Mechanical Engineering) degree program may take courses that also satisfy the requirements of the bioengineering, engineering management, systems engineering, or manufacturing minors.

MASTER OF ENGINEERING (OPERATIONS RESEARCH AND INFORMATION ENGINEERING)

Offered by the School of Operations Research and Information Engineering

Contact: 201 Rhodes Hall, 255-9128,
www.orie.cornell.edu/orie/academics/meng

This professional degree program stresses applications of operations research. The centerpiece of the program is a team-based project on a significant real-world problem. The course work centers on additional study of analytical techniques, with particular emphasis on the design or improvement of systems and processes in manufacturing, information, finance, and service organizations.

General admission and degree requirements are described in the introductory "Degree Programs" section. The ORIE M.Eng. program is designed to serve two groups of students: graduates of the undergraduate major in ORE who wish to deepen their practical knowledge of the field, and qualified undergraduates from other fields who want to complement their engineering or technical backgrounds with a solid foundation in operations research and information engineering.

For admission, the entering student should have completed an introductory course in probability and statistics, an intermediate-level course in computer science, as well as four semesters of mathematics, including

differential equations, linear algebra, and multivariate calculus. For the financial engineering concentration, the entering student must also have completed an intermediate-level probability course and a basic finance course.

Program requirements include a core of ORIE courses plus technical electives chosen from a broad array of offerings. There are several concentrations, each requiring a particular set of electives plus a specific project course. The concentrations include Applied Operations Research, Financial Engineering, Information Technology, Strategic Operations (which incorporates the Strategic Operations Immersion at the Johnson Graduate School of Management), Data Analytics, and Manufacturing and Industrial Engineering. Students may also minor in systems engineering. Several of these options are offered jointly with other Cornell departments and schools and provide the opportunity to interact with students and specialists in business and other engineering fields. For information about the manufacturing and industrial engineering concentration, contact the Center for Manufacturing Enterprise, 291 Grumman Hall, 255-5545; about the Strategic Operations Immersion, 304 Sage Hall, 255-4691; about systems engineering, 280 Rhodes Hall, 254-8998, and for all others, 201 Rhodes Hall, 255-9128.

The applied operations research concentration is designed to be completed in two semesters. The financial engineering concentration is highly specialized and typically requires three semesters to complete. This permits an industry internship in the summer between semesters as well as a third semester of study in New York City. For scheduling reasons, and depending on the student's preparation, the other concentrations may entail an additional summer or semester.

The manner in which the M.Eng. project requirement is met depends on the chosen concentration. Common elements in all project experiences include working as part of a team of three to five students on an engineering design problem, meeting with a faculty advisor on a regular basis, and presenting the final results to the project sponsor. Most projects have industrial client sponsors and address problems that actually exist in practice.

Applicants who already hold graduate degrees in other fields may be interested in the possibility of completing both an M.Eng. and an M.B.A. program within a period of two years, possibly with intervening work experience. This possibility incorporates the Johnson Graduate School of Management Accelerated M.B.A. Program, which is completed in 12 months.

Additional program requirements are described in the *Master of Engineering Handbook* and on the web. For further details, see the contact information at the beginning of this section.

ENGINEERING COURSES

Courses offered in the College of Engineering are listed under the various departments and schools.

Courses are identified with a standard abbreviation followed by a four-digit number.

Engineering Communications	ENGRC
Engineering Distribution	ENGRD
Engineering General Interest	ENGRG
Engineering Introductions	ENGR I
Applied and Engineering Physics	AEP
Biological and Environmental Engineering BEE	
Chemical and Biomolecular Engineering	CHEME
Civil and Environmental Engineering	CEE
Computer Science	CS
Computing and Information Science	CIS
Earth and Atmospheric Sciences	EAS
Electrical and Computer Engineering	ECE
Information Science	INFO
Materials Science and Engineering	MSE
Mechanical and Aerospace Engineering	MAE
Nuclear Science and Engineering	NSE
Operations Research and Information Engineering	ORIE
Systems Engineering	SYSEN
Theoretical and Applied Mechanics	TAM

ENGINEERING COMMON COURSES

Engineering Communications Courses

Courses in this category, offered by the Engineering Communications Program (ECP), develop writing and oral-presentation skills needed by engineers.

ENGRC 3020 Writing-intensive Opportunity: Practicum in Technical Writing

Fall, spring. 1 credit.

One-credit attachment to an existing engineering course that is not one of the officially designated W-I courses. It may be taken more than once, with different courses by permission of a particular engineering faculty member.

ENGRC 3340 Independent Study in Engineering Communications

1–3 credits, variable. Letter grades. TBA with instructor.

Members of the ECP occasionally give independent (also called "directed") studies in engineering communications, typically with students who are ready for advanced work in technical writing. A student doing a directed study works one-on-one with an ECP instructor to pursue an aspect of professional communications in more depth than is possible in the ECP's regular courses. Various types of projects are possible, e.g., studying forms of technical documentation, creating user manuals, analyzing and producing technical graphics, reading and writing about problems in engineering practice, and writing about technical topics for the public.

ENGR 3350 Communications for Engineering Managers (LA)

Fall, spring, 3 credits. Fulfills college technical-writing requirement. May be used as free or approved elective in expressive arts. Intended for juniors and seniors. Limited to 20 students per sec. Prerequisite: two first-year writing seminars and major affiliation.

This seminar focuses on communications in organizational contexts common to engineering graduates. Topics may include internal and external communications; balancing visual and verbal elements in documents and oral presentations; teamwork and leadership; running and attending meetings; management strategies; and communicating with colleagues, superiors, subordinates, and clients. Students develop writing and management strategies that they apply in individual and team assignments. They learn how to organize technical and managerial information, articulate and support ideas, and communicate with technical and nontechnical audiences.

ENGR 3500 Engineering Communications (LA)

Fall and spring, 3 credits. Designed for juniors and seniors. Fulfills college technical-writing requirement. May be used as free or approved elective in expressive arts. Limited to 20 students per sec. Prerequisite: two first-year writing seminars and affiliation with a major.

This course prepares students for important communication activities. They write various types of documents (e.g., letters, memos, executive summaries, problem analyses, proposals, progress reports), give oral presentations, and incorporate graphics in their oral and written work. Students learn how to communicate specialized information to different audiences (e.g., technical and nontechnical people, colleagues and clients, peers and supervisors, in-house departments, and government agencies), work in teams, and address organizational and ethical issues. The course material is drawn from professional contexts, principally engineering, and it generates lively discussion. The class size ensures close attention to each student's work. (Note: Absences are limited to three, after which sharp penalties occur.)

Engineering Distribution Courses

Courses in this category are sophomore-level courses cross-listed with a department. These courses are intended to introduce students to more advanced concepts of engineering and may require pre- or corequisites.

ENGR 2020 Mechanics of Solids (also TAM 2020)

Fall, spring, 4 credits. Prerequisite: PHYS 1112, co-registration in MATH 1920, or permission of instructor. All students must take a lab section. Staff.

Covers principles of statics, force systems, and equilibrium; frames; mechanics of deformable solids, stress, strain, statically indeterminate problems; mechanical properties of engineering materials; axial force, shearing force, bending moment, thermal stress, stretching; bending and torsion of bars. Laboratory experiments demonstrate basic principles of solid mechanics.

ENGR 2030 Dynamics (also TAM 2030)

Fall, spring, 3 credits. Prerequisite: ENGR/TAM 2020, co-registration in MATH 2930, or permission of instructor. All students must take a lab and a section.

Newtonian dynamics of a particle, systems of particles, a rigid body. Kinematics, motion relative to a moving frame. Impulse, momentum, angular momentum, energy. Rigid-body kinematics, angular velocity, moment of momentum, the inertia tensor. Euler equations, the gyroscope. Laboratory experiments demonstrate basic principles of dynamics.

ENGR 2100 Introduction to Circuits for Electrical and Computer Engineers (also ECE 2100)

Fall, spring, 4 credits. Corequisites: MATH 2930 and PHYS 2213. All students must take a lab and a section.

First course in electrical circuits and electronics. Establishes the fundamental properties of circuits with application to modern electronics. Topics include circuit analysis methods, operational amplifiers, basic filter circuits, and elementary transistor principles. The laboratory experiments are coupled closely with the lectures.

ENGR 2110 Object-Oriented Programming and Data Structures (also CS 2110)

Fall, spring, summer, 3 credits. Prerequisite: CS 1110, CS 1130, or CS 1113 or (CS 1112 if completed before fall 2007), or equivalent course in Java or C++.

Intermediate programming in a high-level language and introduction to computer science. Topics include program structure and organization, object-oriented programming (classes, objects, types, sub-typing), graphical user interfaces, algorithm analysis (asymptotic complexity, big "O" notation), recursion, data structures (lists, trees, stacks, queues, heaps, search trees, hash tables, graphs), simple graph algorithms. Java is the principal programming language.

ENGR 2190 Mass and Energy Balances (also CHEME 2190)

Fall, 3 credits. Corequisite: physical chemistry course or permission of instructor. S. Daniel.

Engineering problems involving material and energy balances. Batch and continuous reactive systems in the steady and unsteady states. Introduction to phase equilibria for multicomponent systems. Examples drawn from a variety of chemical and biomolecular processes.

ENGR 2210 Thermodynamics (also MAE 2210)

Fall, spring, may be offered summer, 3 credits. Prerequisites: MATH 1920 Calculus for Engineers, and PHYS 1112 Physics I, Mechanics.

Presents the definitions, concepts, and laws of thermodynamics. Topics include the first and second laws, thermodynamic property relationships, and applications to vapor and gas power systems, refrigeration, and heat pump systems. Examples and problems are related to contemporary aspects of energy and power generation and to broader environmental issues.

ENGR 2300 Introduction to Digital Logic Design (also ECE 2300)

Fall, spring, 4 credits. Prerequisite: CS 1110 or CS 1112.

Introduction to the design and implementation of practical digital circuits. Topics include transistor network design, Boolean algebra, combinational circuits, sequential circuits, finite state machine design, and analog and digital converters. Design methodology using both discrete components and hardware description languages is covered in the weekly laboratory portion of the course.

ENGR 2510 Engineering for a Sustainable Society (also BEE 2510)

Fall, 3 credits. Pre- or corequisite: MATH 2930. B. A. Ahner.

Case studies of contemporary environmental issues including pollutant distribution in natural systems, air quality, hazardous waste management, and sustainable development. Emphasis is on the application of mathematics, physics, and engineering sciences to solve energy and mass balances in environmental sciences. Students are introduced to the basic chemistry, ecology, biology, ethics, and environmental legislation relevant to the particular environmental problem. BEE students must complete either BEE 2510 or BEE 2600 according to their academic plan. BEE students who complete both BEE 2510 and BEE 2600 receive engineering credit for only one of these courses.

ENGR 2520 The Physics of Life (also AEP 2520/5520)

Spring, 3 credits. Prerequisites: MATH 1920, CHEM 2070 or 2090, and co-registration in or completion of PHYS 2213. L. Pollack.

Introduces the physics of biological macromolecules (e.g., proteins, DNA, RNA) to students of the physical sciences or engineering who have little or no background in biology. The macromolecules are studied from three perspectives. First, the biological role or function of each class of macromolecules is considered. Second, a quantitative description of the physical interactions that determine the behavior of these systems is provided. Finally, techniques that are commonly used to probe these systems, with an emphasis on current research, are discussed.

ENGR 2600 Principles of Biological Engineering (also BEE 2600)

Fall, 3 credits. Pre- or corequisite: MATH 2930, BIOP 1101-1104 or 1105/1106. A. J. Baeumner.

Focuses on the integration of biological systems with engineering, math, and physical principles. Students learn how to formulate equations for biological systems in class and practice it in homework sets. Topics range from molecular principles of reaction kinetics and molecular binding events to macroscopic applications, such as energy and mass balances of bioprocessing and engineering design of implantable sensors. BEE students must complete either BEE 2510 or BEE 2600 according to their academic plan. BEE students who complete both BEE 2510 and BEE 2600 receive engineering credit for only one of these courses.

ENGR 2610 Mechanical Properties of Materials: From Nanodevices to Superstructures (also MSE 2610)

Fall, 3 credits. Prerequisite: MATH 1910. Corequisite: PHYS 1112 or permission of instructor. S. P. Baker.

Examines the mechanical properties of materials (e.g., strength, stiffness, toughness, ductility) and their physical origins. Topics include the relationship of elastic, plastic, and

fracture behavior to microscopic structure in metals, ceramics, polymers, and composite materials. Effects of time and temperature on materials properties, and considerations for design and optimal performance of materials in engineered objects and biological tissues.

ENGRD 2620 Electronic Materials for the Information Age (also MSE 2620)

Spring. 3 credits. Prerequisite: MATH 1920. Corequisite: PHYS 2213 or permission of instructor. G. Malliaras.

Examines the electrical and optical properties of materials. Topics include the mechanism of electrical conduction in metals, semiconductors and insulators, the tuning of electrical properties in semiconductors, the transport of charge across metal/semiconductor and semiconductor/semiconductor junctions, and the interaction of materials with light. Applications in electrophotography, solar cells, electronics, and display technologies are discussed.

ENGRD 2640 Computer-Instrumentation Design (also AEP 2640)

Fall, spring. 3 credits. Prerequisite: CS 1110; permission of instructor for seniors. 1 lec, 1 lab. T. Cool.

Covers the use of a small computer in an engineering or scientific research lab. The experiments and devices investigated include analog to digital converters (ADC), digital to analog converters (DAC), digital input/output (I/O), counter/timers, serial port communications, digital temperature control, error analysis, nonlinear least squares fitting of experimental data, viscosity of fluids, a robot arm, and thermal diffusion. C++ programming and graphical programming with LabVIEW™ are used for computer interfacing to hardware. Students develop effective written communication skills in the context of science and engineering. They prepare progress reports, technical reports, and formal articles based on the experiments.

ENGRD 2700 Basic Engineering Probability and Statistics

Fall, spring, summer. 3 credits. Prerequisites: MATH 1910 and 1920. MATH 2940 should be completed before or concurrently with ENGRD 2700.

Gives students a working knowledge of basic probability and statistics and their application to engineering. Includes computer analysis of data and simulation. Topics include random variables, probability distributions, expectation, estimation, testing, experimental design, quality control, and regression.

ENGRD 3100 Introduction to Probability and Random Signals (also ECE 3100)

Fall, summer. 4 credits. Prerequisites: MATH 2940, PHYS 2213, or equivalents.

For description, see ECE 3100.

ENGRD 3200 Engineering Computation

Spring. 3 credits. Prerequisites: CS 1112 and MATH 2930. Corequisite: MATH 2940. Recommended: completion of MATH 2940. P. J. Diamessis.

Introduction to numerical methods, computational mathematics, and probability and statistics. Development of programming and graphics proficiency with MATLAB and spreadsheets. Topics include Taylor-series approximations, numerical errors, condition numbers, operation counts, convergence, and stability, probability distributions, hypothesis testing. Included are numerical methods for solving engineering problems that entail roots

of functions, simultaneous linear equations, statistics, regression, interpolation, numerical differentiation and integration, and solution of ordinary and partial differential equations, including an introduction to finite difference methods. Applications are drawn from different areas of engineering. A group project uses these methods on a realistic engineering problem.

ENGRD 3220 Introduction to Scientific Computation (also CS 3220)

Spring, summer. 3 credits. Prerequisites: CS 1112 or 1132 and MATH 2220, 2230, or 2940.

An introduction to elementary numerical analysis and scientific computation. Topics include interpolation, quadrature, linear and nonlinear equation solving, least-squares fitting, and ordinary differential equations. Uses the MATLAB computing environment. Stresses sectorization, efficiency, reliability, and stability. Special lectures cover computational statistics.

Courses of General Interest

Courses in this category are of general interest and cover technical, historical, and social issues relevant to the engineering profession. These courses may also include seminar or tutorial type courses.

ENGRG 1009 Cooperative Workshop for CHEM 2090

Fall, spring. 1 credit. Corequisite: CHEM 2090. S–U grades only.

Academic Excellence Workshop for CHEM 2090. Weekly two-hour collaborative learning sessions. Peer-facilitated group works on problems at or above the level of course material, designed to enhance understanding of core concepts in CHEM 2090.

ENGRG 1011 Cooperative Workshop for CS 2110

Fall, spring. 1 credit. Corequisite: CS 2110. S–U grades only.

Academic Excellence Workshop for CS 2110. Weekly two-hour collaborative learning sessions. Peer-facilitated group works on problems at or above the level of course material, designed to enhance understanding of core concepts in CS 2110.

ENGRG 1050 Engineering Seminar

Fall. 1 credit. Prerequisite: freshman standing. S–U grades only.

First-year engineering students meet in groups of 18 to 20 students weekly with their faculty advisors. Discussions may include the engineering curriculum and student programs, what engineers do, the character of engineering careers, active research areas in the college and in engineering in general, and study and examination skills useful for engineering students. Groups may visit campus academic, engineering, and research facilities.

ENGRG 1060 Exploration in Engineering Seminar

Summer. 1 credit. Designed for junior and senior high-school students.

Introduction to several engineering fields, such as bioengineering, chemical engineering, civil engineering, computer science, earth sciences, electrical and computer engineering, engineering physics, materials science, mechanical engineering, and operations research. Hands-on experience in weekly labs, as well as design projects to introduce concepts of the engineering design process.

ENGRG 1091 Cooperative Workshop for MATH 1910

Fall. 1 credit. Corequisite: MATH 1910. S–U grades only.

Academic Excellence Workshop for MATH 1910. Weekly two-hour collaborative learning sessions. Peer-facilitated group works on problems at or above the level of course material, designed to enhance understanding of core concepts in MATH 1910.

ENGRG 1092 Cooperative Workshop for MATH 1920

Fall, spring. 1 credit. Corequisite: MATH 1920. S–U grades only.

Academic Excellence Workshop for MATH 1920. Weekly two-hour collaborative learning sessions. Peer-facilitated group works on problems at or above the level of course material, designed to enhance understanding of core concepts in MATH 1920.

ENGRG 1093 Cooperative Workshop for MATH 2930

Fall, spring. 1 credit. Corequisite: MATH 2930. S–U grades only.

Academic Excellence Workshop for MATH 2930. Weekly two-hour collaborative learning sessions. Peer-facilitated group works on problems at or above the level of course material, designed to enhance understanding of core concepts in MATH 2930.

ENGRG 1094 Cooperative Workshop for MATH 2940

Fall, spring. 1 credit. Corequisite: MATH 2940. S–U grades only.

Academic Excellence Workshop for MATH 2940. Weekly two-hour collaborative learning sessions. Peer-facilitated group works on problems at or above the level of course material, designed to enhance understanding of core concepts in MATH 2940.

ENGRG 1010 Cooperative Workshop for CS 1110

Fall, spring. 1 credit. Corequisite: CS 1110. S–U grades only.

Academic Excellence Workshop for CS 1110. Weekly two-hour collaborative learning sessions. Peer-facilitated group works on problems at or above the level of course material, designed to enhance understanding of core concepts in CS 1110.

ENGRG 1012 Cooperative Workshop for CS 1112

Fall, spring. 1 credit. Corequisite: CS 1112. S–U grades only.

Academic Excellence Workshop for CS 1112. Weekly two-hour collaborative learning sessions. Peer-facilitated group works on problems at or above the level of course material, designed to enhance understanding of core concepts in CS 1112.

ENGRG 2350 Career Development for Engineering (also ECE 2350)

Spring. 2 credits. Prerequisite: second-semester freshman or sophomore standing. Introduces concepts and techniques that can be used now and in the future to set appropriate personal and professional career goals.

ENGRG 2500 Technology in Society (also ECE/HIST 2500, STS 2501)

Fall. 3 credits. Approved for humanities distribution.

Investigates the history of technology in Europe and the United States from ancient times to the present. Topics include the economic and social aspects of

industrialization; the myths of heroic inventors such as Morse, Edison, and Ford; the government's regulation of technology; the origins of mass production; and the spread of the automobile and microelectronics cultures in the United States.

ENGRG 2980 Inventing an Information Society (also ECE/AMST 2980, HIST 2920, STS/INFO 2921)

Spring. 3 credits. Approved for humanities distribution.

Explores the history of information technology from the 1830s to the present by considering the technical and social history of telecommunications, the electric-power industry, radio, television, computers, and the Internet. Emphasis is on the changing relationship between science and technology, the economic aspects of innovation, gender and technology, and other social relations of this technology.

ENGRG 3230 Engineering Economics and Management (also CEE 3230)

Spring, sometimes offered in summer for Engineering Co-op Program. 3 credits.

Primarily for juniors and seniors. Students must register under CEE 3230. F. Vanek.

Introduction to engineering and business economics investment alternatives and to project management. Intended to give students a working knowledge of money management and how to make economic comparisons of alternatives involving future benefits and cost. The impact of inflation, taxation, depreciation, financial planning, economic optimization, project scheduling, and legal and regulatory issues are introduced and applied to economic investment and planning and project-management problems.

[ENGRG 3570 Engineering in American Culture (also AMST/HIST 3570, STS 3571)]

ENGRG 3600 Ethical Issues in Engineering Practice (also ECE 3600, STS 3601) (KCM)

Spring. 3 credits. Open to sophomores. Studies major ethical and social issues involved in engineering practice. The issues include responsibility for designing products that do not harm public health, safety, and welfare; rights of engineers in large corporations; risk analysis and the principle of informed consent; conflict of interest; whistle blowing; trade secrets; and broader concerns such as environmental degradation, cost of health care, computer ethics, and working in multinational corporations. Codes of ethics of the professional engineering societies, ethical theory, and the history and sociology of engineering are introduced to analyze these issues.

ENGRG 4610 Entrepreneurship for Engineers (also MAE 4610, ORIE 4152)

Fall. 3 credits. Prerequisite: upper-level engineers or permission of instructor. For description, see MAE 4610.

ENGRG 6780 Teaching Seminar

Fall, spring. 1 credit. S-U grades only. Staff. Independent study promoting reflection on teaching styles and experiences for teaching assistants in the College of Engineering. Participants must be concurrently fulfilling a TA assignment. Requirements include participation in the College of Engineering's TA Development Program, consisting of an initial one and one-half day training session,

followed by one evening microteaching session early in the semester; participation in the TA midterm evaluation process, followed by a formal feedback session with program staff; and completion of a reflective journal on teaching experiences. Designed to provide TAs with the opportunity to process their understanding of teaching and learning through the formulation of questions, concepts, and theories related to their experiences.

Introduction to Engineering Courses

Courses in this category are first-year level courses intended to introduce students to various aspects of engineering. They have no prerequisites and most are cross-listed with a department.

ENGRG 1100 Lasers and Photonics (also AEP 1100)

Fall. 3 credits.

Lasers have had an enormous impact on communications, medicine, remote sensing, and material processing. This course reviews the properties of light that are essential to understanding the underlying principles of lasers and these photonic technologies. There also is a strong, hands-on laboratory component in which the students build and operate a nitrogen laser and participate in several demonstration experiments such as holography, laser processing of materials, optical tweezers, and fiber optics.

ENGRG 1101 Engineering Applications of Operations Research

Fall, spring. 3 credits. Not open to ORIE upper-level majors.

Introduction to the problems and methods of operations research and industrial engineering focusing on problem areas (including inventory, network design, and resource allocation), the situations in which these problems arise, and several standard solution techniques. In the computational laboratory, students encounter problem simulations and use some standard commercial software packages.

ENGRG 1110 Nanotechnology (also MSE 1110)

Fall. 3 credits. C. Umbach.

Nanotechnology has been enabling the Information Revolution with the development of even faster and more powerful devices for manipulation, storing, and transmitting information. In this hands-on course students learn how to design and manipulate materials to build devices and structures in applications ranging from computers to telecommunications to biotechnology.

ENGRG 1120 Introduction to Chemical Engineering (also CHEME 1120)

Fall. 3 credits. Prerequisite: first-year standing. T. M. Duncan.

Design and analysis of processes involving chemical change. Students learn strategies for design, such as creative thinking, conceptual blockbusting, and (re)definition of the design goal, in the context of contemporary chemical and biomolecular engineering. Includes methods for analyzing designs, such as mathematical modeling, empirical analysis by graphics, and dynamic scaling through dimensional analysis, to assess product quality, economics, safety, and environmental issues.

ENGRG 1130 Sustainable Design for Appledore Island (also CEE 1130)

Spring. 3 credits. J. J. Bisogni.

The course utilizes a unique environment, Appledore island, as an example of how sustainability is addressed in the design of basic components of the built environment; energy, water supply, and waste treatment. Students will present preliminary designs of sustainable systems to the engineering staff of Appledore Island.

ENGRG 1160 Modern Structures (also CEE 1160)

Fall. 3 credits. A. Ingraffea.

Introduction to structural engineering in the 21st century—the challenges structural engineers face and the innovative approaches they are using to address them. Using case studies of famous structures, students learn to identify different structural forms and understand how various forms carry load—using principles of statics, mechanics, and material behavior. The historical, economic, social, and political context for each structure is discussed. Case studies of failures are used to explain how structures fail in earthquakes and other extreme events, and students are introduced to analytical and experimental approaches (shake table and wind tunnel testing) to quantifying loads on structures subjected to extreme events. Types of structures considered include skyscrapers, bridges, aircraft, and underground structures.

ENGRG 1170 Introduction to Mechanical Engineering (also MAE 1170)

Fall. 3 credits.

Introduction to fundamentals of mechanical and aerospace engineering. Students learn and understand materials characteristics, the behavior of materials, and material selection for performing engineering function. They also learn fundamentals of fluid mechanics, heat transfer, automotive engineering, engineering design and product development, patents and intellectual property, and engineering ethics. In the final project, students use the information learned to design and manufacture a product.

ENGRG 1190 Biomaterials for the Skeletal System (also MSE 1190)

Fall. 3 credits. D. Grubb.

Biomaterials are at the intersection of biology and engineering. This course explores natural structural materials in the human body, their properties and microstructure, and their synthetic and semi-synthetic replacements. Bones, joints, teeth, tendons, and ligaments are used as examples, with their metal, plastic, and ceramic replacements. Topics include strength, corrosion, toxicity, wear, and biocompatibility. Case studies of design lead to consideration of regulatory approval requirements and legal liability issues.

ENGRG 1200 Introduction to Nanoscience and Nanoengineering (also AEP 1200)

Spring. 3 credits.

Lecture/laboratory course designed to introduce first-year students to some of the ideas and concepts of nanoscience and nanotechnology. Topics include nanoscience and nanotechnology—what they are and why they are of interest; atoms and molecules; the solid state; surfaces; behavior of light and material particles when confined to nanoscale dimensions; scanning tunneling microscopy (STM), atomic force microscopy (AFM), microelectromechanical systems (MEMS) design; basic micromachining and chemical synthesis methods, i.e., “top-down” and “bottom-up” approaches to nanofabrication;

how to manipulate structures on the nanoscale; physical laws and limits they place on the nanoworld; some far-out ideas. In the laboratory, students use an AFM to record atomic resolution images, use a MEMS computer-aided design software package to model the entire manufacturing sequence of a simple MEMS device, examine the simulated behavior of the device and compare it with real behavior, construct a simple STM and learn through hands on experience the basic workings of the device.

ENGRI 1220 Earthquake! (also EAS 1220)

Spring, 3 credits. L. Brown.

Explores the science of natural hazards, their societal impacts and means of mitigation. The focus is on earthquakes, volcanoes, and tsunamis, but hurricanes, severe weather, climate change, landslides, wildfires, and the threat of extinction from a future impact by an extraterrestrial body are also considered.

ENGRI 1260 Introduction to Signals and Telecommunications (also ECE 1260)

Spring, 3 credits.

Introduces the concepts that underlie wired and wireless communication systems. Students achieve a rudimentary understanding of basic ideas such as coding and data compression; frequency content, bandwidth, and filtering; sampling and reconstruction; and time- and frequency-division multiplexing. Discussions of practical applications focus on areas such as the public switched telephone network, ISDN, ATM, and TCP/IP. Students also develop an appreciation for the historical development of the field. The course includes both lectures and laboratory demonstrations.

ENGRI 1270 Introduction to Entrepreneurship and Enterprise Engineering (also MAE 1270)

Spring, 3 credits. Open to all Cornell students regardless of major. Prerequisite: none.

A solid introduction to the entrepreneurial process to students in engineering. The main objective is to identify and to begin to develop skills in the engineering work that occurs in high-growth, high-tech ventures. Basic engineering management issues, including the entrepreneurial perspective, opportunity recognition and evaluation, and gathering and managing resources are covered. Technical topics such as the engineering design process, product realization, and technology forecasting are discussed.

ENGRI 1310 Introduction to Biomedical Engineering (also BME 1310)

Spring, 3 credits. Prerequisite: freshman or sophomore standing. C. B. Schaffer and S. D. Archer.

Modern biology and medicine are undergoing a revolution as quantitative principles of measurement, analysis, and design are introduced to help solve a variety of scientific and medical problems. This course will provide an introduction to the study of biological systems with a quantitative perspective from the molecular to the cellular to the organism scale, as well as to the design of practical devices for studying biological systems and treating disease. Collaborative work will be a key element in all aspects of the course, from the lectures and labs, to the assignments and term project.

ENGRI 1610 Computing in the Arts (also CIS/CS 1610, DANCE 1540, FILM 1750, MUSIC 1465, PSYCH 1650)

Fall, 3 credits. Complements ART 1701+ and MUSIC 1421+. S-U or letter grades. For description, see CS 1610 in the CIS section.

ENGRI 1620 Visual Imaging in the Electronic Age (also ART 1700, CIS/CS 1620)

Fall, 3 credits. S-U or letter grades. Staff. For description, see ART 1700.

APPLIED AND ENGINEERING PHYSICS

F. W. Wise, director; L. Pollack, director of undergraduate studies; C. Xu, director of graduate studies; D. Muller, M.Eng. coordinator; M. Lindau, Co-op coordinator; J. D. Brock, R. A. Buhrman, T. A. Cool, H. G. Craighead, C. J. Fennie, A. L. Gaeta, V. O. Kostroun, M. Lindau, R. V. E. Lovelace, D. Muller, L. Pollack, J. Silcox, W. W. Webb, F. W. Wise, C. Xu. Adjunct faculty: D. H. Bilderback, Q. Hao, S. Heinekamp. Senior research associate: E. J. Kirkland. Lecturer: L. Wickham

AEP 1100 Lasers and Photonics (also ENGRI 1100)

Fall, 3 credits. Course in Introduction to Engineering series. For description, see ENGRI 1100.

AEP 1200 Introduction to Nanoscience and Nanoengineering (also ENGRI 1200)

Spring, 3 credits. Course in Introduction to Engineering series. For description, see ENGRI 1200.

AEP 2170 Electricity and Magnetism (also PHYS 2217)

Fall, spring, 4 credits. Prerequisites: permission of advisor and instructor; co-registration in PHYS 2216 or knowledge of special relativity at level of PHYS 1116; MATH 1920 or equivalent and co-registration in MATH 2930 or equivalent. Staff. Intended for students who have done well in PHYS 1112 or 1116 (or equivalent) and mathematics and who desire a more analytic treatment than that of PHYS 2213. At the level of *Electricity and Magnetism* by Purcell. Recommended for prospective engineering physics majors. Placement quiz may be given early in semester, permitting students who find material too abstract or analytical to transfer into PHYS 2213 without difficulty.

AEP 2520 The Physics of Life (also AEP 5520, ENGRD 2520)

Spring. Prerequisites: MATH 1920, CHEM 2070 or 2090, and co-registration in or completion of PHYS 2213. L. Pollack. For description, see ENGRD 2520.

AEP 2640 Computer-Instrumentation Design (also ENGRD 2640)

Fall, spring, 3 credits. Prerequisites: seniors by permission of instructor; CS 1110. 1 lec, 1 lab. For description, see ENGRD 2640.

AEP 3210 Mathematical Physics I

Fall, summer, 4 credits. Prerequisite: MATH 2930. Intended for upper-level undergraduates in physical sciences. (Prior completion of common course curriculum mathematics and physics courses strongly recommended.) B. Kusse.

Review of vector analysis; complex variable theory, Cauchy-Riemann conditions, complex Taylor and Laurent series, Cauchy integral formula and residue techniques, conformal mapping; Fourier Series; Fourier and Laplace transforms; ordinary differential equations; separation of variables. Texts: *Mathematical Methods for Physicists* by Arfken and *Mathematical Physics* by Butkov.

AEP 3220 Mathematical Physics II

Spring, 4 credits. Prerequisite: AEP 3210. Second of two-course sequence in mathematical physics intended for upper-level undergraduates in physical sciences. B. Kusse.

Topics include partial differential equations, Bessel functions, spherical harmonics, separation of variables, wave and diffusion equations, Laplace, Helmholtz, and Poisson's Equations, transform techniques, Green's functions; integral equations, Fredholm equations, kernels; complex variables, theory, branch points and cuts, Riemann sheets, method of steepest descent; tensors, contravariant, and covariant representations; group theory, matrix representations, class and character. Texts: *Mathematical Methods for Physicists* by Arfken and *Mathematical Physics* by Butkov.

AEP 3240 Maple Supplement to Mathematical Physics 321 and 322

Spring, 1 credit. R. V. E. Lovelace. A broad introduction to Maple in applications to problems of mathematical physics similar to those covered in AEP 3210 and 3220. Uses Maple to solve differential equations—both linear and nonlinear. Makes extensive use of plotting capabilities of Maple. Also covers matrices, complex functions, Laplace and Fourier transforms (and FFTs), and group theory. Gives an introduction to LaTeX.

AEP 3300 Modern Experimental Optics (also PHYS 3300)

Fall, 4 credits. Limited enrollment. Prerequisite: PHYS 2214 or equivalent. E. Bodenschatz.

Practical laboratory course in basic and modern optics. The various projects cover a wide range of topics from geometrical optics to classical wave properties such as interference, diffraction, and polarization. Each experimental setup is equipped with standard, off-the-shelf optics and opto-mechanical components to provide the students with hands-on experience in practical laboratory techniques currently employed in physics, chemistry, biology, and engineering. Students are also introduced to digital imaging and image processing techniques.

AEP 3330 Mechanics of Particles and Solid Bodies

Fall, summer, 4 credits. Prerequisites: PHYS 1112 or 1116 and co-registration in AEP 3210 or equivalent or permission of instructor. Staff.

Covers Newton's mechanics; constants of the motion; many-body systems; linear oscillations; variational calculus; Lagrangian and Hamiltonian formalism for generalized coordinates; non-inertial reference systems; central-force motion; motion of rigid bodies; small vibrations in multi-mass systems; nonlinear oscillations; and basic introduction to relativistic mechanics. Emphasis is on mathematical treatments, physical concepts, and applications. (At the level of *Classical Dynamics* by Marion and Thorton.)

AEP 3550 Intermediate Electromagnetism

Fall, beginning third week of Oct.; summer; second half of semester. 2 credits. Prerequisite: PHYS 2213 or 2217 and co-registration with AEP 3210, or permission of instructor.

Intermediate-level course on electromagnetic theory with a focus on statics. Vector calculus, electrostatics, conductors, dielectric materials, boundary conditions, solutions to Laplace's equation, and magnetostatics. Emphasis is on developing proficiency with analytical techniques and intuitive understanding of fundamental electromagnetism.

AEP 3560 Intermediate Electrodynamics

Spring. 4 credits. Prerequisite: AEP 3550 and co-registration with AEP 3220, or permission of instructor.

Second course in theory of electromagnetism. Magnetic materials, Faraday's law, Maxwell equations, electromagnetic waves, reflection and transmission, guided waves, and radiation.

AEP 3610 Introductory Quantum Mechanics

Fall, through second week of Oct.; summer, first half of semester. 2 credits. Prerequisites: PHYS 2213 or 2217 and co-registration with AEP 3210, or permission of instructor.

Introductory course on the theory of quantum mechanics. Topics include waves, Schrödinger's equation and the concept of the wavefunction, simple potentials, and the harmonic oscillator model. Emphasis is on developing an intuitive understanding of quantum mechanics.

AEP 3620 Intermediate Quantum Mechanics

Spring, 4 credits. Prerequisite: AEP 3610 or PHYS 3316 and co-registration with AEP 3220 or permission of instructor.

Continuation of AEP 3610 covering more advanced material in quantum mechanics. Topics include operator formalism and matrix representation, angular momentum and spin, the hydrogen atom, techniques for solving Schrödinger's equation including perturbation theory, two- and three-level systems, interaction with radiation, and identical particles.

AEP 3630 Electronic Circuits (also PHYS 3360)

Fall, spring, 4 credits. Prerequisites: PHYS 2208 or 2213 or permission of instructor. No previous experience with electronics assumed; however, course moves quickly through introductory topics such as basic DC circuits. Fall semester usually less crowded. 1 lec, 2 labs. Fall: E. Kirkland; spring: Staff.

Students analyze, design, build, and experimentally test circuits used in scientific and engineering instrumentation (with discrete components and integrated circuits). Analog circuits: resistors, capacitors, operational amplifiers (linear amplifiers with feedback, oscillators, comparators), filters, diodes, and transistors. Digital circuits: combinatorial (gates) and sequential (flip-flops, counters, shift registers) logic. Computer interfacing introduced and used to investigate digital to analog (DAC) and analog to digital conversion (ADC) and signal averaging.

AEP 4230 Statistical Thermodynamics

Fall. 4 credits. Prerequisite: introductory three-semester physics sequence, familiarity with quantum mechanics (AEP 3620) and one year junior-level mathematics. Staff.

Quantum statistical basis for equilibrium thermodynamics, microcanonical, canonical and grand canonical ensembles, and partition functions. Classical and quantum ideal gases, paramagnetic and multiple-state systems. Maxwell-Boltzmann, Fermi-Dirac, and Bose-Einstein statistics and applications. Introduction to systems of interacting particles. At the level of *Introductory Statistical Mechanics* by Bowley and Sanchez.

AEP 4340 Continuum Physics

Spring. 4 credits. Prerequisites: AEP 3330 and 3560 or equivalent. Staff.

Topics: Elasticity and Fluid Mechanics: basic phenomena of elasticity, simple beams, stress and strain tensors, materials equations, equations of motion, general beam equations, waves; fluids: basic phenomena, Navier Stokes equation, scaling laws, Reynolds and Froude numbers, Poiseuille flows, Stokes drag on sphere, boundary layers, inviscid and incompressible flows, potential flow, conservation laws, Bernoulli equation, vorticity and circulation, life of wings, jets, instabilities, introduction to turbulence. Projects in combination with AEP 4380 possible. At the level of *Continuum Mechanics* by Lai, Rubin, and Krepl and *Introduction to Fluid Mechanics* by Tritton.

AEP 4380 Computational Engineering Physics

Spring. 3 credits. Prerequisites: CS 1100 or 1112, AEP 3210, 3330, 3550, 3610, or equivalent, or permission of instructor; co-registration in 3620 permitted. Staff.

Numerical computation (e.g., derivatives, integrals, differential equations, matrices, boundary-value problems, relaxation, Monte Carlo methods) is introduced and applied to engineering physics problems that cannot be solved analytically (e.g., three-body problem, electrostatic fields, quantum energy levels). Computer programming required (in C or optionally C++, FORTRAN, or Pascal). Some prior exposure to programming assumed but no previous experience with C assumed.

AEP 4440 Quantum and Nonlinear Optics

Spring. 4 credits. Prerequisites: AEP 3560, 3620, or equivalent. Staff.

Introduction to the fundamentals of the interaction of laser light with matter and to optical devices based on these processes. Topics include the propagation of laser beams in bulk media and guided-wave structures, the origins of optical nonlinearities, harmonic generation, parametric amplification, self-focusing, optical switching, propagation of ultrashort pulses, solitons, four-wave mixing, optical phase conjugation, optical resonance and two-level atoms, atom cooling and trapping, multiphoton processes, spontaneous and simulated scattering, and ultra-intense laser-matter interactions.

AEP 4500 Introductory Solid State Physics (also PHYS 4454)

Fall. 4 credits. Highly recommended: some exposure to quantum mechanics at level of PHYS 4443, AEP 3620, or CHEM 7930. Staff.

Introduction the physics of crystalline solids. Covers crystal structures; electronic states; lattice vibrations; and metals, insulators, and

semiconductors. Computer simulations of the dynamics of electrons and ions in solids. Covers optical properties, magnetism, and superconductivity as time allows. The majority of the course addresses the foundations of the subject, but time is devoted to modern and/or technologically important topics such as quantum size effects. At the level of *Introduction to Solid State Physics* by Kittel or *Solid State Physics* by Ashcroft and Mermun.

AEP 4700 Biophysical Methods (also BIONB 4700)

Fall. 3 credits. Prerequisites: solid knowledge of basic physics and mathematics through sophomore level.

Recommended: some knowledge of cellular biology. Letter grades only.

Overview of the diversity of modern biophysical experimental techniques used in the study of biophysical systems at the cellular and molecular level. Topics include methods that examine both structure and function of biological systems, with emphasis on the applications of these methods to biological membranes. The course format includes assigned literature reviews by the students on specific biophysics topics and individual student presentations on these topics. The course is intended for students of the engineering, physics, chemistry, and biological disciplines who seek an introduction to modern biophysical experimental methods.

AEP 4840 Introduction to Controlled Fusion: Principles and Technology (also ECE/NSE 4840, MAE 4590)

Spring. 3 credits. On demand.

Prerequisites: PHYS 1112, 2213, and 2214, or equivalent background in electricity and magnetism and mechanics; and permission of instructor. Intended for seniors and graduate students;

For description, see NSE 4840.

AEP 4900-4910 Independent Study in Engineering Physics

Fall, spring. Credit TBA.

Laboratory or theoretical work in any branch of engineering physics under the direction of a member of the faculty. The study can take a number of forms; for example, design of laboratory apparatus, performance of laboratory measurements, computer simulation or software developments, theoretical design and analysis. Details TBA with respective faculty member.

AEP 5500 Applied Solid State Physics

Spring. 3 credits. Prerequisites: AEP 3560, 3620, 4230, 4500 or equivalent.

Directed at students who have had an introductory course in solid state physics at the level of Kittel. Concentrates on the application of the quantum mechanical theory of solid state physics to semiconductor materials, solid state electronic devices, solid state detectors and generators of electromagnetic radiation, superconducting devices and materials, the nonlinear optical properties of solids, ferromagnetic materials, nanoscale devices, and mesoscopic quantum mechanical effects. The course stresses the basic, fundamental physics underlying the applications rather than the applications themselves. At the level of *Introduction to Applied Solid State Physics* by Dalven.

AEP 5520 Physics of Life

Spring. 3 credits.

Introduces the physics of biological macromolecules (e.g., proteins, DNA, RNA) to students of the physical sciences or engineering who have little or no background in biology. The macromolecules are studied from three perspectives. First, the biological role or function of each class of macromolecules is considered. Second, a quantitative description of the physical interactions that determine the behavior of these systems is provided. Finally, techniques that are commonly used to probe these systems, with an emphasis on current research are discussed. Additional requirements for AEP M.Eng. students: Research current topic provided by the instructor and give an oral presentation in class.

AEP 5570 Applied Electrodynamics

Fall. 4 credits. At the level of Jackson's *Classical Electrodynamics*.

Topics include wave propagation in dielectrics, conductors, and plasmas; pulse propagation in dispersive media; reflection and transmission at interfaces; diffraction from apertures and periodic media; radiation from charged particles, dipoles, and antennae; scattering of radiation; waveguides and transmission lines; cavities and resonators.

AEP 5710 Biophysical Methods Advanced Laboratory

Spring, first three weeks of Jan. or TBA during spring semester. 3 credits.

Prerequisite: AEP 4700 highly recommended but qualified students who have not taken AEP 4700 also accepted.

Letter or S-U grades. M. Lindau.

Offered to students in the engineering, physics, chemistry, and biological disciplines who are interested in research at the interface between physical sciences/engineering and life sciences. In groups of two, participants perform five experiments in research laboratories on state-of-the-art equipment. Lab training sessions are arranged individually in January and throughout the spring semester. Typically each experiment is two days in the lab plus one day for analysis and report writing. The course is intended for students who seek hands-on introduction to modern biophysical experimental methods.

AEP 6070 Advanced Plasma Physics (also ECE 5820)

Spring. On demand. 4 credits.

Prerequisites: ECE 5810 and AEP 6060.

For description, see ECE 5820.

AEP 6330 Nuclear Reactor Engineering (also NSE 6330)

Fall. 4 credits. Prerequisite: introductory course in nuclear engineering. Offered on demand. K. B. Cady.

For description, see NSE 6330.

AEP 6610 Nanocharacterization

Fall. 3 credits. Prerequisites: Fourier transforms, basic electromagnetism, and undergraduate quantum mechanics or chemistry. Undergraduates should consult with instructor before enrolling.

Graduate-level introduction to the tools used to image and probe optical, electronic, chemical, and mechanical properties at the nanoscale and below. Discussion centers on the physics of the interaction processes used for characterization, quantification, and interpretation of the collected signals, common artifacts, the engineering trade-offs made in constructing the actual instruments,

and the fundamental detection limits for each method. Topics include the interaction of electrons, ions, and photons with materials; scanned probe and force microscopy; scanning and transmission electron microscopy; x-ray microanalysis; electron energy loss spectroscopy; and a brief survey of non-imaging methods such as RBS, XPS, and SIMS.

AEP 6620 Micro/Nano-fabrication and Processing

Spring. 3 credits.

Introduction to the fundamentals of micro- and nano-fabricating and patterning thin-film materials and surfaces, with emphasis on electronic and optical materials, micro-mechanics, and other applications. Vacuum and plasma thin-film deposition processes. Photon, electron, X-ray, and ion-beam lithography. Techniques for pattern replication by plasma and ion processes. Emphasis is on understanding the physics and materials science that define and limit the various processes. At the level of Brodie and Muray.

AEP 6630 Nanobiotechnology (also BIOG 6630, MSE 5630)

Fall. 3 credits. Letter grades only.

Upper-level undergraduate and graduate-level course that covers the basics of biology and the principles and practice of microfabrication techniques. The course focuses on applications in biomedical and biological research. A team design project that stresses interdisciplinary communication and problem solving is one of the course requirements. The course meets twice weekly with 75-minute classes. All lectures are teleconferenced to NBTC associate institutes.

AEP 7110 Principles of Diffraction (also MSE 6710)

Fall. 3 credits. Letter grades only.

J. D. Brock.

Graduate-level introduction to diffraction/scattering phenomena in the context of solid-state and soft condensed-matter systems. The primary topic is using the scattering and absorption of neutron, electron, and X-ray beams to study physical systems. Particular emphasis is placed on issues related to synchrotron X-ray sources. Specific topics include elastic and inelastic scattering; diffraction from two- and three-dimensional periodic lattices; the Fourier representation of scattering centers and the effects of thermal vibrations and disorder; diffraction, reflectivity, or scattering from surface layers; diffraction or scattering from gases and amorphous materials; small angle scattering; X-ray absorption spectroscopy; resonant (e.g., magnetic) scattering; novel techniques using coherent X-ray beams; and a survey of dynamical diffraction from perfect and imperfect lattices.

AEP 7510 M.Eng. Project

Fall, spring. 6–12 credits TBA. Requirement for M.Eng. (engineering physics) students.

Independent study under the direction of a member of the university faculty. Students participate in an independent research project through work on a special problem related to their field of interest. A formal and complete research report is required.

AEP 7530 Special Topics Seminar in Applied Physics

Fall. 1 credit. Requirement for M.Eng. (engineering physics) students; recommended for seniors in engineering physics. Prerequisite: undergraduate physics.

Special topics in applied science, with focus on areas of applied physics and engineering that are of current interest. Subjects chosen are researched in the library and presented in a seminar format by the students. Effort is made to integrate the subjects within selected subject areas such as atomic, biological, computational, optical, plasma, and solid-state physics, or microfabrication technology, as suggested by the students and coordinated by the instructor.

[AEP 7810 Advanced Plasma Physics I: Cosmic Plasma Physics]**AEP 7820 Advanced Plasma Physics (also ECE 6820)**

Spring. 3 credits. Prerequisite: ECE 5810. C. E. Seyler.

For description, see ECE 6820.

BIOLOGICAL AND ENVIRONMENTAL ENGINEERING

D. J. Aneshansley, chair; B. A. Ahner, assoc. chair; L. D. Albright, L. T. Angenent, A. J. Baeumer, J. A. Bartsch, A. K. Datta, K. G. Gebremedhin, D. A. Haiht, P. G. Hess, J. B. Hunter, L. H. Irwin, D. Luo, J. C. March, J.-Y. Parlange, G. E. Rehkugler, N. R. Scott, R. M. Spanswick, T. S. Steenhuis, M. B. Timmons, L. P. Walker, M. F. Walter, M. T. Walter. Lecturers: C. L. Anderson, L. D. Geohring

For complete course descriptions, see "Biological and Environmental Engineering" under "College of Agriculture and Life Sciences" or visit the department web site, www.bee.cornell.edu.

BEE 1200 The BEE Experience

Spring. 1 credit. Requirement for CALS BEE freshmen. Not required for students who have completed ENGRG 1050. Prerequisite: BEE majors or permission of instructor.

BEE 1510 Introduction to Computer Programming

Fall. 4 credits. Limited to 18 students per lab and rec. Pre- or corequisite: MATH 1910 or equivalent. No previous programming experience assumed.

BEE 2220 Bioengineering Thermodynamics and Kinetics

Spring. 3 credits. Prerequisites: MATH 1920, BIOG 1101, PHYS 2213, and chemistry course completed or concurrent.

BEE 2510 Engineering for a Sustainable Society (also ENGRD 2510)

Fall. 3 credits. Pre- or corequisite: MATH 2930.

BEE 2600 Principles of Biological Engineering (also ENGRD 2600)

Fall. 3 credits. Pre- or corequisite: MATH 2930, BIOG 1101–1104 or 1105–1106.

BEE 3050 Principles of Navigation (also NAVS 3050)

Spring. 4 credits. Three classes each week (lec-rec-project work).

BEE 3299 Sustainable Development: A Web-Based Course

Spring, summer. 3 credits. Prerequisite: at least sophomore standing. S-U or letter grades.

BEE 3310 Bio-Fluid Mechanics

Fall. 4 credits. Prerequisites: ENGRD 2020 and engineering math sequence.

BEE 3500 Biological and Environmental Transport Processes

Fall. 3 credits. Pre- or corequisites: MATH 2930 and fluid mechanics course.

BEE 3600 Molecular and Cellular Bioengineering (also BME 3600)

Spring. 3 credits. Prerequisites: BEE 2600, biochemistry, linear algebra, ordinary differential equations, or permission of instructor.

BEE 3650 Properties of Biological Materials

Spring. 3 credits. Pre- or corequisite: ENGRD 2020.

BEE 3680 Biotechnology Applications: Animal Bioreactors

Fall. 3 credits. Prerequisite: biochemistry course or permission of instructor. Offered alternate years.

[BEE 3710 Physical Hydrology for Ecosystems

Spring. 3 credits. Prerequisite: MATH 1920 or permission of instructor. Offered alternate years; next offered 2010-2011.]

BEE 4010 Renewable Energy Systems

Spring. 4 credits. Prerequisite: college physics.

BEE 4270 Water Measurement and Analysis Methods

Fall. 3 credits. Prerequisites: fluids or hydrology course and MATH 1910.

BEE 4350 Principles of Aquaculture

Spring. 3 credits. Prerequisite: at least junior standing.

BEE 4500 Bioinstrumentation

Spring. 4 credits. Prerequisites: MATH 2940, introductory computing, two semesters of physics, statistics, or permission of instructor.

BEE 4530 Computer-Aided Engineering: Applications to Biomedical Processes (also MAE 4530)

Spring. 3 credits. Prerequisite: heat and mass transfer course (BEE 3500 or equivalent).

[BEE 4540 Physiological Engineering

Fall. 3 credits. Prerequisites: differential equations, two semesters of physics, introductory biology, statistics. Next offered 2010-2011.]

BEE 4590 Biosensors and Bioanalytical Techniques

Fall. 3 credits. Prerequisite: biochemistry course or permission of instructor.

BEE 4600 Deterministic and Stochastic Modeling in Biological Engineering

Fall. 3 credits. Prerequisites: MATH 2930, MATH 2940, BEE 3500 or equivalent, Mass and Energy Balances, or permission of instructor.

BEE 4640 Bioseparation Processes

Fall. 3 credits. Prerequisites: introductory biochemistry and physics, MATH 1920, BEE 2600 or equivalent, or permission of instructor. S-U or letter grades. Offered alternate years.

[BEE 4710 Introduction to Groundwater (also EAS 4710)

Spring. 3 credits. Prerequisites: MATH 2930, fluid mechanics or hydrology course. S-U or letter grades. Offered alternate years; next offered 2010-2011.]

BEE 4730 Watershed Engineering

Fall. 4 credits. Prerequisite: CEE 3310 or hydrology course.

BEE 4740 Water and Landscape Engineering Applications

Spring. 3 credits. Prerequisite: fluids or hydrology course or permission of instructor.

BEE 4750 Environmental Systems Analysis

Fall. 3 credits. Prerequisites: computer programming course and one year of calculus.

BEE 4760 Solid Waste Engineering

Spring. 3 credits. Prerequisites: one semester of physics and chemistry.

BEE 4800 Our Changing Atmosphere: Global Change and Atmospheric Chemistry (also EAS 4800)

Fall. 3 credits. Prerequisites: CHEM 2090, MATH 1920, PHYS 1112 or equivalent, or permission of instructor. S-U or letter grades.

BEE 4810 LRFD-Based Engineering of Wood Structures (also CEE 4810)

Spring. 3 credits. Prerequisite: ENGRD 2020.

BEE 4840 Metabolic Engineering

Spring. 3 credits. Prerequisite: biochemistry course or permission of instructor.

BEE 4860 Industrial Ecology of Agriculturally Based Bioindustries

Spring. 3 credits. Prerequisites: one year calculus, some knowledge of MATLAB.

BEE 4870 Sustainable Energy Systems

Fall. 3 credits. Prerequisites: BEE 3500 and thermodynamics course.

BEE 4890 Entrepreneurial Management for Engineers

Fall. 4 credits. Prerequisites: ENGRD 2700 or CEE 3040 or equivalent highly recommended; junior standing.

BEE 4900 Biofuels: The Economic and Environmental Interactions (also AEM 6900)

Spring. 2 credits. Prerequisites: senior or graduate standing, a course in microeconomics, others by permission of instructor. S-U or letter grades.

BEE 4930 Technical Writing for Engineers

Fall or spring. 1 credit.

BEE 4960 Capstone Design in Biological and Environmental Engineering

Spring. 1 credit. Corequisite: BEE 4810.

BEE 4970 Individual Study in Biological and Environmental Engineering

Fall, spring. 1-4 credits. Prerequisites: written permission of instructor and adequate ability and training for work proposed. Normally reserved for seniors in upper two-fifths of their class. Students from all colleges must register using independent study form (available in 207 Riley-Robb Hall).

BEE 4980 Undergraduate Teaching

Fall, spring. 1-4 credits. Prerequisite: written permission of instructor. Students from all colleges must register using independent study form (available in 207 Riley-Robb Hall).

BEE 4990 Undergraduate Research

Fall, spring. 1-4 credits. Prerequisites: written permission of instructor; adequate training for work proposed. Normally reserved for seniors in upper two-fifths of their class. Students from all colleges must register using independent study form (available in 207 Riley-Robb Hall).

BEE 4991-4992 Honors Research

Fall, spring. 1-6 credits. Prerequisite: enrollment in BEE Honors Research Program.

BEE 5010 Bioengineering Seminar (also BME 5010)

Fall, spring. 1 credit. Prerequisite: junior, senior, or graduate standing. S-U grades only.

BEE 5330 Engineering Professionalism

Spring. 1-2 credits. Prerequisite: graduate student with accredited engineering degree or senior who will be graduate with accredited engineering degree. Must register to take Fundamentals of Engineering Exam. Lec only for first 10 weeks of semester. S-U or letter grades.

BEE 5901-5902 M.P.S. Project

Fall, spring. 1-6 credits. Requirement for all M.P.S. candidates in field.

BEE 5951-5952 Master of Engineering Design Project

Fall, spring. 3-6 credits. Prerequisite: admission to M.Eng. degree program.

BEE 6430 Veterinary Perspectives on Pathogen Control in Animal Manure (also VTMED/BIOMI 6430)

Spring, eight weeks. 2 credits. Prerequisites: limited to third- and fourth-year veterinary students, graduate students, and advanced undergraduate students interested in agricultural engineering as related to animal manure management.

BEE 6470 Water Transport in Plants (also BIOPL 6510)

Fall. 2 credits. Offered alternate years.

[BEE 6490 Solute Transport in Plants (also BIOPL 6490)

Fall. 3 credits. Offered alternate years; next offered 2010-2011.]

[BEE 6510 Bioremediation: Engineering Organisms to Clean Up the Environment

Spring. 3 credits. Prerequisite: BIOMI 2900 or BIOBM 3310 or permission of instructor. Next offered 2010-2011.]

BEE 6550 Thermodynamics and Its Applications

Fall. 3 credits. Prerequisite: MATH 2930 or equivalent; for undergraduates, permission of instructor. Offered alternate years.

BEE 6590 Biosensors and Bioanalytical Techniques

Fall. 3 credits. Prerequisites: biochemistry course and permission of instructor.

[BEE 6710 Analysis of the Flow of Water and Chemicals in Soils

Fall. 3 credits. Prerequisites: four calculus courses and fluid mechanics course; for undergraduates, permission of instructor. Offered alternate years; next offered 2010–2011.]

BEE 6720 Drainage

Spring. 4 credits. Prerequisite: BEE 4710 or 4730. Offered alternate years.

BEE 6740 Ecohydrology

Spring. 3 credits. Prerequisite: ecohydrology or hydrology course. Offered alternate years.

BEE 6870 The Science and Engineering Challenges to the Development of Sustainable Bio-Based Industries

Fall. 1 credit. Prerequisite: graduate standing. S–U grades only.

BEE 6970 Graduate Individual Study in Biological and Environmental Engineering

Fall, spring. 1–6 credits. Prerequisite: permission of instructor. S–U or letter grades.

BEE 7000 Orientation to Graduate Study

Fall. 1 credit. Prerequisite: newly joining graduate students in BEE. S–U grades only.

BEE 7010 BEE Seminar Series

Spring. 1 credit. S–U or letter grades.

BEE 7540 Water and Culture in the Mediterranean: A Crisis

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. S–U or letter grades.

BEE 7600 Nucleic Acid Engineering (also BME 7600)

Spring. 2 credits. Prerequisite: graduate standing; seniors by permission of instructor. S–U or letter grades.

BEE 7710 Soil and Water Engineering Seminar

Fall, spring. 1 credit. Prerequisite: graduate standing or permission of instructor. S–U or letter grades.

BEE 8900 Master's-Level Thesis Research

Fall, spring. 1–15 credits. Prerequisite: permission of advisor. S–U grades only.

BEE 9900 Doctoral-Level Thesis Research

Fall, spring. 1–15 credits. Prerequisite: permission of advisor. S–U grades only.

BIOMEDICAL ENGINEERING

M. L. Shuler, James M. and Marsha McCormick chair; L. J. Bonassar, associate chair; J. T. Butcher, P. C. Doerschuk, director of graduate studies, C. Fischbach-Teschl, M. Jin, M. R. King, W. L. Olbricht, D. A. Putnam, C. Reinhart-King, C. B. Schaffer, D. J. Skorton, Y. Wang, W. R. Zipfel. Senior lecturers: S. D. Archer, D. Lipson, R. W. Newman

BME 1310 Introduction to Biomedical Engineering (also ENGRI 1310)

Spring. 3 credits. Prerequisite: freshman or sophomore standing. C. B. Schaffer and S. D. Archer.

For description, see ENGRI 1310.

BME 3010 Molecular Principles of Biomedical Engineering (also CHEME 4010)

Fall. 3 credits. Prerequisite: basic biology such as BIOG 1110, BIOBM 3300, or BIOMI 2900. Lec and lab. M. Jin and S. D. Archer.

Introduction to genomics, proteomics, bioinformatics, and computational biology with an emphasis on the engineering challenges for these areas. Covers cytoskeletal and motor proteins and their relationship to nano- and micro-machines and nanobiotechnology. Existing and emerging technologies and instrumentation critical to molecular-level analysis in biomedical engineering.

BME 3020 Cellular Principles of Biomedical Engineering (also CHEME 4020)

Spring. 3 credits. Prerequisite: BME 3010 or course work in basic biology such as BIOG 1110, BIOBM 3300, or BIOMI 2900 plus mathematics through differential equations (e.g., MATH 2210 or 2940), or permission of instructor. Lec and lab. C. Fischbach-Teschl, W. Zipfel, and S. D. Archer.

Integration of mammalian cell biology with engineering modeling principles, put into the context of medical pathology and disease states. Consists of three modules: (1) cell culture techniques/receptor ligand interactions, (2) cellular trafficking, and (3) signal transduction.

BME 3300 Introduction to Computational Neuroscience (also BIONB/PSYCH/COGST 3300)

Fall. 3 or 4 credits; 4 credits includes lab providing additional computer simulation exercises. Limited to 25 students. Prerequisites: BIONB 2220 or permission of instructor. S–U or letter grades. Offered alternate years. C. Linster.

For description, see BIONB 3300.

BME 3600 Molecular and Cellular Bioengineering (also BEE 3600)

Spring. 3 credits. Prerequisite: BEE 2600, biochemistry course, linear algebra, ordinary differential equations, or permission of instructor.

For description, see BEE 3600.

BME 4010 Biomedical Engineering Analysis of Metabolic and Structural Systems (also MAE 4660)

Fall. 3 credits. Prerequisite: basic biology course work. Highly recommended: solid mechanics and fluid mechanics courses. Lec and lab. L. J. Bonassar and S. D. Archer.

Presents the quantitative biology of the renal, respiratory, cardiovascular, and musculoskeletal systems. Includes mathematical modeling of physiological processes involving mechanics and transport in solid and fluid organs.

BME 4020 Electrical and Chemical Physiology

Spring. 3 credits. Prerequisite: BME 3010, 3020, or 4010 or biology background or permission of instructor. Lec and lab. D. Lipson and S. D. Archer.

Focuses on understanding how circulating agents and bioelectric activity comprises inter-organ and central nervous system communication, and control of the human body. Additional emphasis includes examining medical devices involved in the treatment of human disease.

BME 4110 Science and Technology Approaches to Problems in Human Health

Fall. 3 credits. Prerequisites: junior, senior, or graduate standing; sophomores by permission of instructor. C. B. Schaffer and M. G. Kaplitt.

Provides an in-depth look at diseases that impact human health along with current scientific research and engineering that is aimed at addressing these problems. Faculty from the Weill Cornell Medical College will discuss health problems they are unable to treat as well as they would like, then Cornell University and Weill faculty will discuss current research aimed at better understanding disease process, developing new treatment strategies, and improving patient outcomes. The course is particularly appropriate for students considering medical school or careers in biomedical science and engineering.

BME 4640 Orthopaedic Tissue Mechanics (also MAE 4640)

Spring. 3 credits. Prerequisites: ENGRD 2020 and MAE 3250 or permission of instructor. Offered alternate years.

For description, see MAE 4640.

BME 4810 Biomedical Engineering (also CHEME 4810)

Spring. 3 credits. Prerequisite: CHEME 3240 or equivalent or permission of instructor. W. L. Olbricht.

For description, see CHEME 4810.

BME 4900 Independent Undergraduate Project in Biomedical Engineering

Fall, spring. Variable credit. Staff. Research or projects by an individual or a small group of undergraduates.

BME 4910 Principles of Neurophysiology (also BIONB 4910)

Spring. 4 credits. Limited to 20 students. Prerequisite: BIONB 2220 or written permission of instructor. S–U or letter grades for graduate students by permission of instructor. B. R. Johnson.

For description, see BIONB 4910.

BME 5010 Bioengineering Seminar (also BEE 5010)

Fall, spring. 1 credit. Prerequisite: junior, senior, or graduate standing. Staff.

Gives the engineer-in-training a BROAD overview of different aspects of biological and biomedical engineering including business, legal, and clinical issues. To give students a working knowledge of how abstracts are written and revised. Sessions may occasionally be held outside of scheduled times.

BME 5020 Biomedical System Design (also ECE 5020)

Spring. 1-4 credits. Pre- or corequisites: at least one of ECE 4250, 4760, 4530.
J. C. Belina.

For description, see ECE 5020.

BME 5030 Electronic Bioinstrumentation (also ECE 5030)

Fall. 4 credits. Prerequisites: Introductory Biology, analog design, signal processing, at the level of BIOL 1010, ECE 3150, and ECE 4250, respectively. M.Eng. students only. Permission of instructor required.
B. R. Land.

For description, see ECE 5030.

BME 5390 Biomedical Materials and Devices for Human Body Repair (also FSAD 4390)

Spring. 2-3 credits. Prerequisites: junior or senior standing; college natural science requirement (chemistry or biology).
C. C. Chu.

For description, see FSAD 4390.

BME 5400 Biomedical Computation

Fall. 3 credits. Prerequisites: MATH 293 and 294 (or equivalent), and introductory computer programming course. M. R. King. The application of numerical and statistical methods to model biological systems and interpret biological data, using the MATLAB programming language.

BME 5500 Product Engineering and Design in Biomedical Engineering

Fall. 3 credits. Prerequisite: graduate standing; requirement for M.Eng. students majoring in BME. D. Lipson and R. W. Newman.

A beginning to a cornerstone understanding of engineering, regulatory business, and individual issues for new medical product development. Student background and interests may be highly varied. To accommodate these varied perspectives, the initial focus of the class is on the engineering perspectives of design and development, enabling those undertaking projects (BME 5910) to have timely exposure to key enabling concepts.

BME 5600 Biotransport and Drug Delivery

Spring. 3 credits. Prerequisites: CHEME 324 and MATH 293, or equivalent. M. R. King. This course focuses on engineering analysis of drug delivery applications and basic transport processes in physiological systems. Specific topics include targeted drug delivery, controlled drug release, biorheology, capillary mass transport, and pharmacokinetic compartmental models.

BME 5620 Biomaterialization (also MSE 5620)

Spring. 3 credits. L. Estroff.
For description, see MSE 5620.

[BME 5650 Biomechanical Systems—Analysis and Design (also MAE 5650)]**[BME 5690 Clinical Biomechanics of Musculoskeletal Tissues (also MAE 5690)]**

Fall. 3 credits. Offered alternate years; next offered 2010-2011. Y. Gao.
For description, see MAE 5690.]

BME 5700 Biophysical Methods (also BIONB/AEP 4700)

Fall. 3 credits. Prerequisites: solid knowledge of basic physics and mathematics through sophomore level.

Recommended: some knowledge of cellular biology. Letter grades only.
M. Lindau.

For description, see AEP 4700.

BME 5710 Analytical Techniques for Material Science (also MSE 5710)

Spring. 3 credits. D. Grubb.

For description, see MSE 5710.

BME 5780 Computer Analysis of Biomed Images (also ECE 5780)

Spring. 4 credits. Prerequisite: permission of instructor. A. P. Reeves.

For description, see ECE 5780.

BME 5810 Soft Tissue Biomechanics (also MAE 5680)

Fall. 3 credits. Prerequisites: graduate standing; seniors by permission of instructor. J. T. Butcher.

Introduces concepts of biomechanics applied to understanding the material behavior of soft tissues. Topics include finite strain, nonlinearities, constitutive frameworks, and experimental methodologies. Tissues to be modeled include tendons, blood vessels, heart valves, cartilage, and engineered tissues.

BME 5830 Cell-Biomaterials Interactions

Fall. 3 credits. Corequisites: BME 3010, concurrent with 3020, or permission of instructor. C. Reinhart-King.

Biological principles underlying biomaterial design and cell adhesive behavior, incorporating biomechanical analysis across the molecular, cellular, and tissue length scales.

BME 5850 Current Practice in Tissue Engineering

Fall. 3 credits. Corequisites: BME 3010 or 4010 (or BME 3020 as corequisite).
C. Fischbach-Teschl.

Covers fundamental biological principles and engineering concepts underlying the field of tissue engineering and describes specific strategies to engineer tissues for clinical use along with examples.

BME 5910 Design Project

Fall, spring. 3-6 credits. Requirement for M.Eng. students majoring in BME. Students encouraged to register for two semesters as continuing course. D. Lipson and staff.

Design and economic evaluation of a biomedical engineering device or therapeutic strategy. Team projects are encouraged.

BME 5930 Independent Design Project

Fall and spring. Variable credit.

Prerequisite: graduate standing. D. Lipson and staff.

Graduate-level nonthesis research or studies on special projects in biomedical engineering.

BME 6180 Principles of Medical Imaging (also VTMED 6180)

Fall. 1-3 credits. Prerequisites: 3-credit enrollment requires functional knowledge and skills of linear algebra, calculus, Fourier transformation, and calculus-based physics. Y. Wang and N. Dykes.

One-credit version requires attendance the first five weeks of lectures on nonmathematical description of imaging principles and field trips to Cornell University Hospital for Animals (CUHA) to see imaging in clinical practice. Three-credit version requires attendance for the entire semester. The later part of the lectures focus on mathematical description of imaging principles. The formulations of spatial encoding and image contrasts are presented for all major medical imaging modalities: x-ray, CT, MR,

SPECT/PET, US. The inverse problem between detected signal and image source will be discussed and the concepts of image resolution, SNR, and scan time will be illustrated analytically and quantitatively for all modalities.

BME 6260 Biomedical Optics, Imaging, and Spectroscopy

Spring. 3 credits. Prerequisites: introductory physics, calculus, and biology. W. R. Zipfel.

Fundamentals of optical systems design, application, and analysis of concepts used in biological imaging and biomedical optics. The course covers the theory and application of light sources, lenses, mirrors, dispersion elements, optical fibers, detectors, and tissue optics; optical systems analysis concepts such as resolution, optical transfer functions, deconvolution and interference, all in relation to biomedical microscopy, spectroscopy, and bioanalytical techniques.

BME 6310 Engineering Principles for Drug Delivery (also CHEME 6310)

Fall. 3 credits. Prerequisites: graduate standing and background in organic and polymer chemistry or permission of instructor. D. A. Putnam.

Application of engineering design principles to problems in drug formulation and delivery. Specific topics include traditional drug formulation, mechanisms and kinetics of pharmaceutical stability. Stimuli-sensitive systems, controlled-release devices, prodrugs, targeted drug delivery, biomaterials, gene therapy, and governmental regulatory issues.

BME 6410 Biomedical Engineering Analysis of Proteins for Medicine

Spring. 3 credits. Prerequisites: graduate standing and background in biology and chemistry. M. Jin.

Protein engineering principles applied to developing molecules for biotherapeutics and biophysical studies. Course topics include general overview on biochemistry, molecular understanding of proteins in cell signaling, physiology, and pathophysiology, and reviews on modern instrumentations for biophysical studies of proteins. Includes hands-on experience with computers and algorithms for structure inspection and rational design of proteins for medicine.

BME 6501 Natural Engineering: Developmental Biology Paradigms for Regenerative Medicine

Spring. 1-3 credits. Prerequisite: graduate student standing. J. T. Butcher.

The course will be in two modules. The first module, a 1-credit course, will cover the embryonic development and fetal maturation of several major organ systems, including lung, heart, vascular, and bone from an engineer's perspective (evolutionary conservation, major signaling pathways involved, etc.). The second module, a 2-credit course, will build upon the first module by highlighting engineering approaches to study developmental biology (systems biology, mechanical testing, micro-environmental control, genetic manipulation, tissue engineering, etc.). We will also identify relationships between developmental biology and postnatal disease, as well as explore developmental biology-based approaches for regenerative medicine (directed stem cell differentiation, mechanical conditioning, matrix based differentiation, etc.). Material will be drawn largely from primary literature. Students will have regular manuscript reviews,

two midterms, and a final project analyzing the natural engineering of a different organ system.

BME 6640 Mechanics of Bone (also MAE 6640)

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. Offered alternate years. For description, see MAE 6640.

[BME 6650 Principles of Tissue Engineering (also MAE/MSE 6650)]

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. Offered alternate years; next offered 2010–2011. L. Bonassar.

Covers introductory concepts in tissue engineering, including polymeric biomaterials used for scaffolds, mechanisms of cell-biomaterial interaction, biocompatibility and foreign body response, cell engineering, and tissue biomechanics. This knowledge is applied to engineering of several body systems, including the musculoskeletal system, cardiovascular tissues, the nervous system, and artificial organs. These topics are discussed in the context of scale-up, manufacturing, and regulatory issues.]

BME 6670 Nanobiotechnology (also AEP/ BIOG 6630, MSE 5630)

Spring. 3 credits. Letter grades only. M. L. Shuler. Upper-level undergraduate and graduate-level course that covers the basics of biology and the principles and practice of microfabrication techniques. Course lectures are largely from guest faculty with expertise in the presented topic areas. The course focuses on applications in biomedical and biological research. A team design project that stresses interdisciplinary communication and problem solving is one of the course requirements. The course meets twice weekly with 75-minute classes. All lectures may be teleconferenced to NBTC associate institutes.

BME 7030 Graduate Student Teaching Experience

Fall, spring. Variable credit. S–U or letter grades. Staff. Guided individual experience in laboratory instruction and/or lectures/recitation instruction. Provides a preparatory teaching experience for graduate students considering an academic career.

BME 7110 Fundamentals of Biomedical Engineering Research I

Fall. 3 credits. Prerequisite: BME M.S./Ph.D. graduate students. W. R. Zipfel and staff. First part of a two-semester sequence that introduces students to a variety of subjects in biomedical engineering including nanobiotechnology, biomechanics, systems and computational biology, biomaterials, tissue engineering, statistics, and experimental design. The course also covers associated subjects including professional development, ethics, writing a scientific paper, authorship issues, patents, technology transfer, conflicts of interest, and preparing a research proposal. The course is a combination of lectures and discussions, with students taking an active role in the instruction.

BME 7120 Fundamentals of Biomedical Engineering Research II

Spring. 3 credits. Prerequisite: BME 7110 or permission of instructor. W. L. Olbricht and staff. Continuation of BME 7110.

BME 7160 Immersion Experience in Medical Research and Clinical Practice

Fall. 6 credits. Prerequisite: Ph.D. students in BME. L. J. Bonassar and Y. Wang. Seven-week immersion at Weill Medical College. Students participate in lectures, rounds, and seminars; observe surgeries; and solve medical problems presented by the staff.

BME 7310 Advanced Biomedical Engineering Analysis of Biological Systems

Fall. 3 credits. Prerequisite: graduate standing; priority given to M.S./Ph.D. and M.Eng. students majoring in BME. P. C. Doerschuk. Covers the fundamentals of quantitative analysis of biological systems. Illustrates analytical methods applicable to a variety of biological systems, ranging from molecular to cellular to organ to application of whole-body systems.

BME 7600 Nucleic Acid Engineering (also BEE 7600)

Spring. 2 credits. Prerequisite: graduate standing; BEE 3600 or permission of instructor. D. Luo. For description, see BEE 7600.

BME 7900 Biomedical Engineering Seminar

Fall, spring. 1 credit. Prerequisite: graduate standing. M. L. Shuler. Research-based seminars. May meet with other seminar series as appropriate.

BME 8600 Doctoral Research Rotations in Biomedical Engineering

Fall. 1 credit. Restricted to first-year Ph.D. students. Staff. This course provides a mechanism for granting course credit for optional research rotations of four to eight weeks in duration self-arranged by first-year Ph.D. students.

BME 8999 M.S. Thesis Research

Fall, spring. Variable credit. Staff. Thesis research for the M.S. degree in BME.

BME 9999 Ph.D. Thesis Research

Fall, spring. Variable credit. Staff. Thesis research for the Ph.D. degree in BME.

CHEMICAL AND BIOMOLECULAR ENGINEERING

P. Clancy, director; A. B. Anton, L. A. Archer, A. M. Center, C. Cohen, S. Daniel, M. P. DeLisa, T. M. Duncan, J. R. Engstrom, F. A. Escobedo, T. Hanrath, A. J. Hunter, Y. L. Joo, D. L. Koch, W. L. Olbricht, D. A. Putnam, M. L. Shuler, P. H. Steen, A. D. Stroock, J. W. Tester, J. D. Varner

CHEME 1120 Introduction to Chemical Engineering (also ENGR 1120)

Fall. 3 credits. Prerequisite: freshman standing. T. M. Duncan. Course in the Introduction to Engineering series. For description, see ENGR 1120.

CHEME 2190 Mass and Energy Balances (also ENGR 2190)

Fall. 3 credits. Corequisite: physical chemistry course or permission of instructor. S. Daniel. For description, see ENGR 2190.

CHEME 2880 Biomolecular Engineering: Fundamentals and Applications

Fall. 3 credits. Corequisite: ENGRD 2190. J. D. Varner. An introduction to modern biology including aspects of biochemistry and molecular and cellular biology intended for students with no significant background in this area. An emphasis on practical applications of this knowledge in a variety of settings including the production of industrial enzymes, pharmaceuticals, and biologics.

CHEME 3010 Nonresident Lectures

Spring. 1 credit. Staff. Lecturers from industry and from selected departments of the university provide information to assist students in their post-graduate plans.

CHEME 3130 Chemical Engineering Thermodynamics

Fall. 3 credits. Prerequisite: physical chemistry II. T. Hanrath. Studies the first and second laws and their consequences for chemical systems. Covers thermodynamic properties of pure fluids, solids, and mixtures; phase and chemical reaction equilibrium; heat effects in batch and flow processes; and power cycles and refrigeration.

CHEME 3230 Fluid Mechanics

Spring. 3 credits. Prerequisites: CHEME 2190 and MATH 2930. L. A. Archer. Fundamentals of fluid mechanics. Macroscopic and microscopic balances. Applications to problems involving viscous flow.

CHEME 3240 Heat and Mass Transfer

Fall. 3 credits. Prerequisite: CHEME 3230. Staff. Fundamentals of heat and mass transfer. Macroscopic and microscopic balances. Applications to problems involving conduction, convection, and diffusion.

CHEME 3320 Analysis of Separation Processes

Spring. 3 credits. Prerequisites: CHEME 3130 and 3240. A. B. Anton. Covers the analysis of separation processes involving phase equilibria and mass transfer. Topics include phase equilibria; equilibrium-based separations; rate-based separation processes (membrane separations, sorption operations); introduction to bioseparations and process simulators; choosing a separation option; and the design and synthesis of separation processes.

CHEME 3720 Introduction to Process Dynamics and Control

Spring. 2 credits. Prerequisites: CHEME 3130 and 3230. J. R. Engstrom. Modeling and analysis of the dynamics of chemical processes, Laplace transforms, block diagrams, feedback control systems, and stability analysis.

CHEME 3900 Chemical Kinetics and Reactor Design

Spring. 3 credits. Prerequisites: CHEME 3130 and 3230. T. M. Duncan. Study of chemical reaction kinetics and principles of reactor design for chemical processes.

CHEME 4010 Molecular Principles of Biomedical Engineering (also BME 3010)

Fall. 3 credits. Prerequisite: BIOG 1110 or BIOBM 3300. M. Jin.

For description, see BME 3010.

CHEME 4020 Cellular Principles of Biomedical Engineering (also BME 3020)

Spring. 3 credits. Staff.

For description, see BME 3020.

CHEME 4130 Introduction to Nuclear Science and Engineering (also AEP/ECE/MAE/NSE/TAM 4130)

Fall. 3 credits. B. Cady.

For description, see TAM 4130

CHEME 4320 Chemical Engineering Laboratory

Fall. 4 credits. Prerequisites: CHEME 3230, 3240, 3320, and 3900. A. M. Center and staff.

Laboratory experiments in fluid dynamics, heat and mass transfer, separations, other operations. Correlation and interpretation of data. Technical report writing.

CHEME 4620 Chemical Process Design

Spring. 4 credits. Prerequisite: CHEME 4320. A. M. Center and staff.

Students prepare a full-scale feasibility study of a chemical process including product supply and demand forecasts, process design including reaction system design, separations scheme development, heat integration via application of pinch technology, and economic analysis of the process. Students develop presentation and teamwork skills through weekly presentations.

CHEME 4700 Process Control Strategies

Spring. 3 credits. A. M. Center.

Introduction to how control concepts are represented, control valve sizing and selection, process control strategies, dynamic response of process systems as it relates to control loop tuning, statistical process control, advanced process control methods both for chemical and biological processes and programmable logic controllers and distributed control systems.

CHEME 4720 Feedback Control Systems (also ECE 4720, MAE 4780)

Fall. 4 credits. Prerequisites: CHEME 3720, ECE 2200, MAE 3260, or permission of instructor. M. Campbell.

For description, see MAE 4780.

[CHEME 4800 Chemical Processing of Electronic Materials]**CHEME 4810 Biomedical Engineering (also BME 4810)**

Spring. 3 credits. Prerequisite: CHEME 3240 or equivalent or permission of instructor. W. L. Olbricht.

Special topics in biomedical engineering, including cell separations, blood flow, design of artificial devices and artificial organs, biomaterials, image analysis, biological transport phenomena, pharmacokinetics and drug delivery, tissue engineering, and analysis of physiological processes such as adhesion, mobility, secretion, signaling, and growth.

CHEME 4840 Microchemical and Microfluidic Systems

Fall. 3 credits. Prerequisite: CHEME 3900 or permission of instructor. J. R. Engstrom.

Principles of chemical kinetics, thermodynamics, and transport phenomena applied to

microchemical and microfluidic systems.

Applications in distributed chemical production, portable power, micromixing, separations, and chemical and biological sensing and analysis. Fabrication approaches (contrasted with microelectronics), transport phenomena at small dimensions, modeling challenges, system integration, case studies.

CHEME 4900 Undergraduate Projects in Chemical Engineering

Fall, spring. Variable credit.

Research or studies on special problems in chemical engineering.

CHEME 4980 Design and Testing of the Chemical Engineering Car

Fall, spring. 3-4 variable credits; 3 credits for team members or 4 for officers.

Prerequisites: ENGRD 2190 and CHEM 2090. J. D. Varner.

Research, design, and construct a small chemical-powered model car. Participate in team-oriented hands-on construction of a car powered with a chemical energy source that will carry a specified load a given distance and stop. The AIChE Student Chapter enters it in the AIChE Regional Conference to qualify and compete in the organization's national conference competition.

CHEME 4990 Senior Seminar

Fall, spring. 1 credit. Prerequisite: CHEME seniors. Staff.

Students attend seminars of their selection and write one-page summaries. Eligible seminars include all listings at "Colloquia and Seminars in Physics and Related Fields," which includes the weekly seminars in, for example, Chemical and Biomolecular Engineering, Chemistry and Chemical Biology, Earth and Atmospheric Sciences, History and Ethics of Engineering, and Materials Science and Engineering.

CHEME 5200 An Overview of Chemical Processing (module)

Fall, spring. 1-6 credits; 1 credit per sec.

Fall, first third of semester. 1 credit.

Prerequisite: Chemical Engineering seniors and M.Eng. A. M. Center and Staff.

Covers how the demands of fitness for purpose and market forces shape processes in the areas of pharmaceuticals, petrochemicals, and agricultural chemicals.

CHEME 5201 Introduction to Biomedical Engineering (module)

Spring, first third of semester. 1 credit.

W. L. Olbricht.

Co-meets with CHEME 4810.

[CHEME 5202 Introduction to Electronic Materials Processing (module)]**CHEME 5203 Introduction to Polymer Processing (module)**

Spring, second third of semester. 1 credit.

L. A. Archer.

Overview and simple quantitative analyses of several plastic processes with an emphasis on the role of rheology in polymer processing.

CHEME 5204 Turbomachinery Applications (module)

Fall, last third of semester. 1 credit.

A. M. Center.

Introduction to pumps, compressors, steam turbines and gas turbines. How they are specified and selected for services in the chemical process industries.

CHEME 5205 Chemical Engineering Tools and Equipment (module)

Spring, first third of semester. 1 credit.

A. M. Center.

Introduces the hardware used in chemical engineering processes and a discussion of how these mechanical devices are configured to meet their process objectives. Also includes an introduction to the evaluation techniques and trouble-shooting methods frequently used by chemical engineers.

CHEME 5207 Introduction to Petroleum Refining (module)

Fall, second third of semester. 1 credit.

A. M. Center.

Covers the petroleum refining industry including crude oil evaluation, fuel quality, refining processes, refinery configurations, and refinery economics.

[CHEME 5208 Renewable Resources from Agriculture-Sugarcane as a Feedstock (module)]

Spring, last third of semester. 1 credit. Next offered 2010-2011.

Maximizing the value of a renewable resource by control of inputs and final product use.]

CHEME 5430 Biomolecular Engineering of Bioprocesses

Fall. 3 credits. Prerequisite: CHEME 3900 or

permission of instructor. No prior background in biological sciences required.

M. P. DeLisa.

Discusses principles involved in using biomolecules (e.g., antibodies, enzymes, DNA) and living organisms (e.g., bacteria, yeast, tissue cultures) for engineering biological processes. Primary emphasis is on development and production of biopharmaceuticals, but biological waste treatment and medical systems are also considered.

CHEME 5640 Design of Chemical Reactors

Spring. 3 credits. Prerequisite: CHEME 3900 or equivalent. D. L. Koch.

Design, scale-up, and optimization of chemical reactors with allowance for heat and mass transfer and non-ideal flow patterns. Homework problems feature analysis of published data for gas-solid, gas-liquid, and three-phase reaction systems.

CHEME 5650 Design Project

Fall, spring. 3 or 6 credits. Requirement for Chemical Engineering M.Eng. students. Staff.

Design study and economic evaluation of a chemical processing facility, alternative methods of manufacture, raw-material preparation, food processing, waste disposal, or some other aspect of chemical processing.

CHEME 5720 Managing New Business Development

Fall. 3 credits. Prerequisite: graduate

standing or permission of instructor. Staff.

Case study approach introducing the typical fundamental factors driving a business venture, examines how to develop implementation strategies for the venture, and teaches the project management skills necessary to successfully implement the venture.

CHEME 5870 Energy Seminar I (also MAE 5450, ECE 5870)

Fall. 1 credit. D. Hammer and A. J. Hunter.

For description, see ECE 5870.

CHEME 5880 Energy Seminar II (also MAE 5460, ECE 5880)

Fall, 1 credit. D. Hammer and A. J. Hunter.
For description, see ECE 5880.

CHEME 5999 Special Projects in Chemical Engineering

Fall, spring. Variable credit. Prerequisite: graduate standing. Staff.
Nonthesis research or studies on special problems in chemical engineering.

CHEME 6240 Physics of Micro- and Nanoscale Fluid Mechanics and Heat Transfer

Fall, 3 credits. Prerequisites: undergraduate fluid or continuum mechanics (e.g., MAE 3230, CHEME 3230, AEP 4340) or permission of instructor. B. L. Kirby.
For description, see MAE 5240.

CHEME 6310 Engineering Principles for Drug Delivery (also BME 6310)

Fall, 3 credits. Prerequisite: graduate standing or permission of instructor. D. A. Putnam.

For description, see BME 6310.

CHEME 6400 Polymeric Materials

Fall, 3 credits. C. Cohen.
Covers chemistry and physics of the formation and characterization of polymers; principles of fabrication.

CHEME 6440 Aerosols and Colloids

Fall, 3 credits. D. L. Koch.
Dynamics of micro- and nano-particles, which contain many molecules but are small enough that molecular effects are important. Topics include the formation and growth of particles; their transport, theological and phase behaviors; and their role in technologies including paints, foods, health-care products, drug delivery, composite materials and air pollution control.

CHEME 6610 Air Pollution Control

Spring, 3 credits. P. H. Steen.
Covers origin of air pollutants, U.S. emission standards, dispersion equations; design of equipment for removal of particulate and gaseous pollutants formed in combustion and chemical processing.

CHEME 6640 Energy Economics

Fall, 3 credits. A. J. Hunter.
Supply and demand for energy by sectors and regions. Operating systems and costs. Economic drivers used in simulating energy systems and consumption factors. Supply/demand projections. Interplay between energy, environment, politics, economics, and sustainability.

CHEME 6650 Energy Engineering

Spring, 3 credits. A. J. Hunter.
Applying thermodynamic concepts to large energy systems. Future energy scenarios. Project teams tasked with simulating complex energy systems and cost-benefit analysis.

CHEME 7110 Advanced Chemical Engineering Thermodynamics

Fall, 3 credits. Prerequisite: CHEM 3890–3900 and CHEME 3130 or equivalent. F. A. Escobedo.

Molecular thermodynamics of gases, lattices, and liquids, including special applications to problems in chemical engineering.

CHEME 7130 Chemical Kinetics and Transport

Spring, 5 credits. Prerequisite: CHEME 3900 or equivalent. S. Daniel and staff.

Topics include microscopic and macroscopic viewpoints; connections between phenomenological chemical kinetics and molecular reaction dynamics; reaction cross sections, potential energy surfaces, and dynamics of biomolecular collisions; molecular beam scattering; transition state theory. Unimolecular reaction dynamics; complex chemically reacting systems: reactor stability, multiple steady states, oscillations, and bifurcation; reactions in heterogeneous media; and free-radical mechanisms in combustion and pyrolysis.

CHEME 7310 Advanced Fluid Mechanics and Heat Transfer

Fall, 3 credits. Prerequisites: CHEME 3230–3240 or equivalent. D. L. Koch.

Topics include derivation of conservation equations; conductive heat transfer; low Reynolds number fluid dynamics; lubrication theory; inviscid fluid dynamics; boundary layer theory; forced convection; and introduction to non-Newtonian fluid mechanics (polymeric liquids and suspensions), microfluidics, stability analysis, and turbulent flow.

CHEME 7410 Selected Topics in Biochemical Engineering

Fall, spring, 1 credit; may be repeated for credit. Prerequisite: permission of instructor. D. A. Putnam and M. P. DeLisa.
Discussion of current topics and research in biochemical engineering for graduate students.

CHEME 7450 Physical Polymer Science I

Fall, 3 credits. Corequisite: CHEME 7110 or equivalent. Offered alternate years. L. A. Archer.

Thermodynamic properties of solutions from both classical and scaling approaches. Characterization techniques of dilute solutions. Rubber elasticity; mechanical and thermodynamic properties of gels; polymer melts.

CHEME 7510 Mathematical Methods of Chemical Engineering Analysis

Fall, 4 credits. Y. L. Joo.
Application of advanced mathematical techniques to chemical engineering analysis. Mathematical modeling, scaling, regular and singular perturbations, multiple scales, asymptotic analysis, linear and nonlinear ordinary and partial differential equations, statistics, data analysis, and curve fitting.

[CHEME 7530 Analysis of Nonlinear Systems: Stability, Bifurcation, and Continuation

Fall, 3 credits. Prerequisite: CHEME 7510 or equivalent. Offered alternate years; next offered 2010–2011. P. H. Steen.

Topics include elements of stability and bifurcation theory; branch-following techniques; stability of discrete and continuous systems; and application to elasticity, reaction-diffusion, and hydrodynamic systems using software for continuation problems (AUTO).]

CHEME 7900 Seminar

Fall, spring, 1 credit each semester.
Requirement for all graduate students in field of chemical and biomolecular engineering. L. A. Archer.
General chemical engineering seminar.

CHEME 7920 Principles and Practices of Graduate Research

Fall, 1 credit. S. Daniel and T. Hanrath.
A colloquium/discussion group series for first-year graduate students. Topics include the

culture and responsibilities of graduate research and the professional community; the mechanics of conducting research (experimental design, data analysis, serendipity in research, avoiding self-deception), documenting research (lab notebooks, computer files) and reporting research (writing a technical paper and oral presentations).

CHEME 8999 Thesis Research

Fall, spring. Variable credit. Staff.
Thesis research for the M.S. degree in chemical engineering.

CHEME 9999 Thesis Research

Fall, spring. Variable credit. Staff.
Thesis research for the Ph.D. degree in chemical engineering.

CIVIL AND ENVIRONMENTAL ENGINEERING

P. L-F. Liu, director; W. D. Philpot, associate director; J. F. Abel, W. Aquino, L. Banks-Sills, J. J. Bisogni, Jr., W. H. Brutsaert, P. G. Carr, E. A. Cowen, P. J. Diamessis, R. I. Dick, C. Earls, H. O. Gao, K. Gebremedhin, J. M. Gossett, M. D. Grigoriu, D. A. Haith, K. C. Hover, A. R. Ingraffea, P. Koutsourelakis, F. H. Kulhawy, L. W. Lion, D. P. Loucks, J. R. Mbwana, W. McGuire, A. H. Meyburg, L. K. Nozick, T. D. O'Rourke, T. Peköz, P. Petrina, R. E. Richardson, R. E. Schuler, C. A. Shoemaker, J. R. Stedinger, H. E. Stewart, C. H. Trautmann, M. A. Turnquist, D. Warner, F. Wayno, M. Weber-Shirk, R. N. White

Courses in the School of Civil and Environmental Engineering are offered in three broad mission areas: Civil Infrastructure, Environment, and Engineering Systems and Management. Each area has several areas of specialization. The following are the course numbers and titles listed by specialization within each mission area. Some courses are listed in two or more mission areas because the course content is relevant to multiple areas. The school also offers a number of general courses that are not unique to one mission area. Full course descriptions follow in the subsequent section and are listed in numerical order.

General

CEE 1130 Sustainable Design for Appledore Island (also ENGRI 1130) (s,3)

CEE 1160 Modern Structures (also ENGRI 1160) (f,3)

CEE 3040 Uncertainty Analysis in Engineering (f,4)

CEE 3080 Introduction to CADD (f,s,1)

CEE 3090 Special Topics in Civil and Environmental Engineering (f,s,var.)

CEE 3200 Engineering Computation (also ENGRD 3200) (s,3)

CEE 3230 Engineering Economics and Management (also ENGRG 3230) (s,su,3)

CEE 4000 Senior Honors Thesis (f,s,var.)

CEE 4010 Undergraduate Engineering Teaching in CEE (f,s,var.)

Civil Infrastructure

See also: CEE 1160, 3040, 3080, 3200, and 5950

Geotechnical Engineering

- CEE 3410 Introduction to Geotechnical Engineering (f,4)
- CEE 4400 Foundation Engineering (s,3)
- CEE 4410 Retaining Structures and Slopes (f,3)
- CEE 4440 Environmental Site and Remediation Engineering (s,3)
- CEE 5041/5042 Design Project in Geotech/Structures (f,s,3)
- CEE 6045 Special Topics in Geotechnical Engineering (f,s,var.)
- CEE 6070 Seminar—Civil Infrastructure (f,s,1)
- CEE 6400 Foundation Engineering (s,3)
- CEE 6410 Retaining Structures and Slopes (f,3)
- CEE 6440 Environmental Site and Remediation Engineering (s,3)
- CEE 7040 Research in Geotechnical Engineering (f,s,var.)
- CEE 7400 Engineering Behavior of Soils (f,3)
- CEE 7410 Rock Engineering (f,3)
- CEE 7440 Advanced Foundation Engineering (s,2)
- CEE 7450 Soil Dynamics (s,3)
- CEE 7460 Embankment Dam Engineering (s,2)
- CEE 8400 Thesis—Geotechnical Engineering (f,s,var.)

Structural Engineering

- CEE 1160 Modern Structures (f,3)
- CEE 3710 Structural Modeling and Behavior (s,4)
- CEE 3720 Intermediate Solid Mechanics (f,4)
- CEE 4710 Fundamentals of Structural Mechanics (f,su,4)
- CEE 4720 Introduction to the Finite Element Method (f,3)
- CEE 4730 Design of Concrete Structures (f,4)
- CEE 4740 Introduction to the Behavior of Metal Structures (s,4)
- CEE 4750 Concrete Materials and Construction (s,3)
- CEE 4770 Introduction to Composite Materials (f,3)
- CEE 4780 Structural Dynamics and Earthquake Engineering (s,3)
- CEE 4810 LRFD-Based Engineering of Wood Structures (s,3)
- CEE 5071/5072 Design Project in Structural Engineering (f,s,3)
- CEE 6070 Seminar—Civil Infrastructure (f,s,1)
- CEE 6075 Special Topics in Structural Engineering (f,s,var.)
- CEE 6710 Fundamentals of Structural Mechanics (f,3)
- CEE 6720 Introduction to the Finite Element Method (f,3)
- CEE 6730 Design of Concrete Structures (f,4)
- CEE 6750 Concrete Materials and Construction (s,3)
- CEE 6760 Advanced Composite Materials (s,4)

- CEE 6770 Engineering Analysis (f,3)
- CEE 6780 Structural Dynamics and Earthquake Engineering (s,3)
- CEE 6790 Evaluation and Failure of Structures (s,3)
- CEE 7070 Research in Structural Engineering (f,s,var.)
- CEE 7073 Civil and Environmental Engineering Materials Project (f,s,var.)
- CEE 7700 Engineering Fracture Mechanics (f,3)
- CEE 7710 Stochastic Mechanics in Science and Engineering (f,3)
- CEE 7720 Random Vibration (f,3)
- CEE 7730 Structural Reliability (f,3)
- CEE 7740 Advanced Structural Concrete (f,3)
- CEE 7750 Nonlinear Finite Element Analysis (s,3)
- CEE 7760 Advanced Topics in Stability (s,3)
- CEE 7770 Advanced Concepts in Finite Element Methods (s,4)
- CEE 7790 Nonlinear Finite Element Analysis II (f,4)
- CEE 8700 Thesis—Structural Engineering (f,s,var.)

Environment

See also CEE 1130, 3200, 3040, and 4920

Environmental Engineering

- CEE 1130 Sustainable Design for Appledore Island (s,3)
- CEE 2550 AguaClara: Sustainable Water Supply Project (f,s,var.)
- CEE 3510 Environmental Quality Engineering (s,3)
- CEE 4510 Microbiology for Environmental Engineering (f,3)
- CEE 4520 Water Supply Engineering (f,3)
- CEE 4530 Laboratory Research in Environmental Engineering (f,3)
- CEE 4540 Sustainable Small-Scale Water Supplies (f,3)
- CEE 4550 AguaClara: Sustainable Water Supply Project (f,s,3)
- CEE 5051/5052 Design Project in Environmental Engineering (f,s,3)
- CEE 6020 Seminar—Water Resources and Environmental Engineering (f,1)
- CEE 6051 Seminar—Environmental Quality Engineering (s,1)
- CEE 6055 Special Topics in Environmental Engineering (f,s,var.)
- CEE 6530 Water Chemistry for Environmental Engineering (f,3)
- CEE 6540 Aquatic Chemistry (s,3)
- CEE 6550 Transport, Mixing, and Transformation in the Environment (f,3)
- CEE 6560 Physical/Chemical Process (f,3)
- CEE 6570 Biological Processes (s,3)
- CEE 6580 Biodegradation and Biocatalysis (s,3)
- CEE 7050 Research in Environmental Engineering (f,s,var.)

- CEE 7360 Turbulences and Turbulent Mixing in Environmental Stratified Flows (s,3)
- CEE 8500 Thesis—Environmental Engineering (f,s,var.)

Environmental Systems

See Engineering Systems and Management mission areas for a listing of courses in Environmental and Public Systems.

Environmental Fluid Mechanics and Hydrology

- CEE 3310 Fluid Mechanics (f,su,4)
- CEE 3320 Hydraulic Engineering (s,4)
- CEE 4320 Hydrology (s,3)
- CEE 4350 Coastal Engineering (s,3)
- CEE 4360 Case Studies in Environmental Fluid Mechanics (s,4)
- CEE 4370 Experimental Methods in Fluid Dynamics (s,3)
- CEE 6000 Advanced Numerical Methods for Engineers (f,3)
- CEE 6020 Seminar—Water Resources and Environmental Engineering (f,1)
- CEE 6030 Seminar—Environmental Fluid Mechanics/Hydrology (s,1)
- CEE 6035 Special Topics in Hydraulics (f,s,var.)
- CEE 6300 Spectral Methods for Incompressible Environmental Fluids (f,4)
- CEE 6310 Computational Simulation of Flow and Transport in the Environment (s,3)
- CEE 6320 Hydrology (s,3)
- CEE 6330 Flow in Porous Media and Groundwater (s,3)
- CEE 6340 Boundary Layer Meteorology (f,3)
- CEE 6350 Small and Finite Amplitude Water Waves (s,3)
- CEE 6360 Environmental Fluid Mechanics (s,3)
- CEE 6370 Experimental Methods in Fluid Dynamics (s,4)
- CEE 6550 Transport, Mixing, and Transformation in the Environment (f,3)
- CEE 7030 Research in Hydraulics (f,s,var.)
- CEE 8300 Thesis—Fluid Mechanics and Hydrology (f,s,var.)

Engineering Systems and Management

See also CEE 3040.

Engineering Management

- CEE 4920 Engineers for a Sustainable World (f,3)
- CEE 5900 Project Management (f,s,4)
- CEE 5910/5920 Engineering Management Project (f,s,3)
- CEE 5930 Engineering Management Methods (f,3)
- CEE 5940 Economic Methods for Engineering and Management (f,4)
- CEE 5950 Construction Planning and Operations (f,3)
- CEE 5960 Management Issues in Forensic Engineering (f,3)
- CEE 5970 Risk Analysis and Management (s,3)

CEE 6095 Special Topics in Engineering Management (f,s,var.)

CEE 6900 Creativity, Innovation, and Leadership (s,3)

Environmental and Public Systems

CEE 3230 Engineering Economics and Management (also ENGRG 3230) (s,su,3)

CEE 4650 Transportation, Energy, and Environment Systems for Sustainable Development (s,3)

CEE 5021/5022 Design Project in Environmental or Water Resource Systems (f,s,3)

CEE 5970 Risk Analysis and Management (s,3)

CEE 6021 Seminar—Environmental and Water Resources Systems Analysis (s,1)

CEE 6025 Special Topics in Environmental and Water Resources Systems Analysis (f,s,var.)

CEE 6200 Water Resources Systems Engineering (s,3)

CEE 6210 Stochastic Hydrology (s,3)

CEE 6230 Environmental Quality Systems Engineering (f,3)

CEE 6360 Environmental Fluid Mechanics (s,4)

CEE 6650 Transportation, Energy, and Environment Systems for Sustainable Development (s,3)

CEE 6930 Public Systems Modeling (f,4)

CEE 7020 Environmental and Water Resources Systems Analysis Research (f,s,var.)

CEE 8200 Thesis—Environmental and Water Resources Systems (f,s,var.)

Remote Sensing

CEE 4110 Environmental Information Science (also CSS 4110) (s,3)

CEE 6015 Special Topics—Remote Sensing (f,s,var.)

CEE 6100 Remote Sensing Fundamentals (also CSS 6100) (f,3)

CEE 6150 Digital Image Processing (s,3)

CEE 7010 Research—Remote Sensing (f,s,var.)

CEE 8100 Thesis—Remote Sensing (f,s,var.)

Systems Engineering

CEE 4060 Civil Infrastructure Systems (s,3)

CEE 5240 Applied Systems Engineering (also CIS 5040, ECE/ORIE 5120, MAE 5910, SYSEN 5100) (f,3)

CEE 5252 Systems Architecture, Behavior, and Optimization (also CIS 5050, ECE/ORIE 5130, MAE 5920, SYSEN 5200) (s,3)

CEE 5290 Heuristic Methods for Optimization (also CS 5722, ORIE 5340) (f,3–4)

CEE 6090 Seminar—Engineering Systems and Management (f,s,1)

CEE 6860 Civil Infrastructure Systems (s,3)

CEE 6930 Public Systems Modeling (f,4)

Transportation

CEE 3610 Introduction to Transportation Engineering (s,su,3)

CEE 4610 Urban Transportation Planning and Modeling (s,3)

CEE 4630 Future Transportation Technologies and Systems (f,3)

CEE 4640 Transportation Systems Design (s,3)

CEE 4650 Transportation, Energy, and the Environment System for Sustainable Development (s,3)

CEE 5061/5062 Design Project in Transportation Engineering (f,s,3)

CEE 6060 Seminar—Transportation (f,s,1)

CEE 6065 Special Topics in Transportation (f,s,var.)

CEE 6610 Urban Transportation Planning and Modeling (s,3)

CEE 6620 Urban Transportation Network and Design and Analysis (f,3)

CEE 6630 Network Flows and Algorithms (s,3)

CEE 6650 Transportation, Energy, and the Environment System for Sustainable Development (s,3)

CEE 7620 Practicum in Modeling Transportation Systems (f,3)

CEE 8600 Thesis—Transportation Engineering (f,s,var.)

CEE 1130 Sustainable Design for Appledore Island (also ENGR 1130)

Spring. 3 credits. Students must register under ENGR 1130. J. J. Bisogni. Course in Introduction to Engineering series. For description, see ENGR 1130.

CEE 1160 Modern Structures (also ENGR 1160)

Fall. 3 credits. Students must register under ENGR 1160. A. Ingraffea. Course in Introduction to Engineering series. For description, see ENGR 1160.

CEE 2550 AguaClara: Sustainable Water Supply Project

Fall, spring. 1–3 credits. Meets with CEE 4550. M. L. Weber-Shirk. For description, see CEE 4550.

CEE 3040 Uncertainty Analysis in Engineering

Fall. 4 credits. Prerequisite: first-year calculus. J. R. Stedinger. Introduction to probability theory and statistical techniques, with examples from civil, environmental, biological, and related disciplines. Covers data presentation, commonly used probability distributions describing natural phenomena and material properties, parameter estimation, confidence intervals, hypothesis testing, simple linear regression, and nonparametric statistics. Examples include structural reliability, windspeed/flood distributions, pollutant concentrations, and models of vehicle arrivals.

CEE 3080 Introduction to CADD

Fall, spring. 1 credit. Prerequisites: Pre-enrollment limited to Engineering students. CEE and BEE students will be given preference. All other students are by permission of instructor only, and only after the first meeting of the sections. Students must attend the first meeting of one of the sections. Course begins first Mon. of each semester. Staff.

Students learn to employ computer-aided design and drafting (CADD) to construct 2D drawings and 3D models using a variety of AutoCAD techniques. VIZ, an alternative software tool for 3D modeling and 3D visualization, is also introduced. Course meets in ACCEL (second floor of the Engineering Library in Carpenter Hall) so that each student

can participate on an individual computer. Grades are based on attendance, weekly exercises completed in class, and a semester project due the last week of classes.

CEE 3090 Special Topics in Civil and Environmental Engineering

Fall, spring. 1–6 credits. Staff. Supervised study by individuals or groups of upper-division students on an undergraduate research project or on specialized topics not covered in regular courses.

CEE 3200 Engineering Computation (also ENGRD 3200)

Spring. 3 credits. Students must register under ENGRD 3200. P. Diamessis. For description, see ENGRD 3200.

CEE 3230 Engineering Economics and Management (also ENGRG 3230)

Spring; usually offered in summer for Engineering Co-op Program. 3 credits. Primarily for juniors and seniors. F. Vanek. For description, see ENGRG 3230.

CEE 3310 Fluid Mechanics

Fall; usually offered in summer for Engineering Co-op Program. 4 credits. Pre- or corequisite: ENGRD 2020. E. A. Cowen. Covers hydrostatics, the basic equations of incompressible fluid flow, potential flow and dynamic pressure forces, viscous flow and shear forces, steady pipe flow, turbulence, dimensional analysis, laminar and turbulence boundary layer, flows around obstacles, and open-channel flow. Includes small-group laboratory assignments.

[CEE 3320 Hydraulic Engineering

Spring. 4 credits. Prerequisite: CEE 3310. Next offered 2011–2012. P. L.-F. Liu. Application of fluid-mechanical principles to problems of engineering practice and design: hydraulic machinery, open-channels, and river engineering. Lectures supplemented by laboratory work and a design project.]

CEE 3410 Introduction to Geotechnical Engineering

Fall. 4 credits. Prerequisites: ENGRD 2020 or permission of instructor. Letter grades only. H. E. Stewart. Fundamentals of geotechnical engineering. Topics include origins and descriptions of soil and rock as engineering materials, subsurface exploration methods, principles of effective stresses, stress distribution and ground settlements from surface loads, steady-state and time-dependent subsurface fluid flow, soil strength and failure criteria, geoenvironmental applications, and introduction to hazardous waste containment systems.

CEE 3510 Environmental Quality Engineering

Spring. 3 credits. Staff. Introduction to engineering aspects of environmental quality control. Quality parameters, criteria, and standards for water and wastewater. Elementary analysis pertaining to the modeling of pollutant reactions in natural systems, and introduction to design of unit processes for wastewater treatment.

CEE 3610 Introduction to Transportation Engineering

Spring; usually offered in summer for Engineering Co-op Program. 3 credits. M. A. Turnquist. Introduces technological, economic, and social aspects of transportation. Emphasizes design and functioning of transportation systems and

their components. Covers supply-demand interactions; system planning, design, and management; traffic flow, intersection control and network analysis; institutional and energy issues; and environmental impacts.

CEE 3710 Structural Modeling and Behavior

Spring. 4 credits. Prerequisite: ENGRD 2020. Corequisite: MATH 2940. A. Ingrassia. Introduction to the structural engineering enterprise including aspects of design, loads, behavior, form, modeling, mechanics, materials, analysis, and construction/manufacturing. Case studies involve different scales and various materials. Topics include analytical and finite-element computational modeling of structural systems, including cables, arches, trusses, beams, frames, and 2-D continua; deflections, strains, and stresses of structural members, systems, and 2-D continua by analytical and work/energy methods, with a focus on linear elastic behavior; the foundations of matrix structural analysis; and the application of finite-element software.

CEE 3720 Intermediate Solid Mechanics

Fall. 4 credits. Prerequisites: MATH 2940, CEE 3710. D. Warner. The course presents concepts related to inelastic and nonlinear behavior of engineering materials and structures, the concept of continuum, limit and plastic analysis, and fracture. The course will be a synergy of mathematical modeling, computer simulations, and physical experimentation.

CEE 4000 Senior Honors Thesis

Fall, spring. 1–6 credits. For students admitted to CEE Honors Program. D. Warner. Supervised research, study, and/or project work resulting in a written report or honors thesis.

CEE 4010 Undergraduate Engineering Teaching in CEE

Fall, spring. 1–3 credits. Prerequisite: permission of instructor. Staff. Methods of instruction developed through discussions with faculty and by assisting with the instruction of undergraduates under the supervision of faculty.

CEE 4060 Civil Infrastructure Systems

Spring. 3 credits. Prerequisites: probability and statistics (CEE 3040 or equivalent) or permission of instructor. Recommended: engineering economics (CEE 3230 or equivalent) course. S–U or letter grades. T. D. O'Rourke. Introduction to the framing and solution of civil infrastructure problems using a systems engineering approach. Systems tools, such as optimization, life-cycle cost analysis, decision analysis, simulation, and risk analysis are examined through case studies related to civil infrastructure.

CEE 4110 Environmental Information Science (also CSS 4110)

Spring. 3 credits. Prerequisite: permission of instructor. S. D. DeGloria and S. B. Hoskins. For description, see CSS 4110.

CEE 4320 Hydrology

Spring. 3 credits. Prerequisite: CEE 3310. Intended for undergraduates. Lec concurrent with CEE 6320. W. H. Brutsaert. Introduction to hydrology as a description of the water cycle and the role of water in the natural environment, and other issues for

environmental engineers. See description for CEE 6320.

CEE 4350 Coastal Engineering

Spring. 4 credits. Prerequisite: CEE 3310. Taught based on demand; contact professor if interested in course. P. L-F. Liu. Covers the following topics: review of hydrodynamics; small-amplitude wave theory; wave statistics; wave-structure interactions; coastal processes.

[CEE 4360 Case Studies in Environmental Fluid Mechanics

Spring. 4 credits. Prerequisite: CEE 3310 or equivalent. Next offered 2010–2011. E. A. Cowen.

An introduction to fundamental fluid mechanics and transport processes of the environment through laboratory—and field—based studies (Cayuga Lake and Fall, Six-Mile, and Cascadilla Creeks) and case studies. Topics include surface and internal wave dynamics, sediment and nutrient/contaminant transport, and interfacial transfer. Lectures are based on a laboratory/field project. Course includes a design project.]

CEE 4370 Experimental Methods in Fluid Dynamics

Spring. 3 credits. Pre- or corequisites: CEE 3310 or equivalent and CEE 3040 or equivalent. E. A. Cowen. Same as CEE 6370 but no project required. For description, see CEE 6370.

CEE 4400 Foundation Engineering

Spring. 3 credits. Prerequisite: CEE 3410. F. H. Kulhawy. Covers soil exploration, sampling, and in-situ testing techniques; bearing capacity, stress distribution, and settlement; design of shallow and deep foundations; compaction and site preparation; and seepage and dewatering of foundation excavations.

CEE 4410 Retaining Structures and Slopes

Fall. 3 credits. Prerequisite: CEE 3410. T. D. O'Rourke. Covers earth pressure theories; design of rigid, flexible, braced, tied-back, slurry wall, soil nailing, and reinforced soil structures; stability of excavation, cut, and natural slopes; and design problems stressing application of course material under field conditions of engineering practice.

[CEE 4440 Environmental Site and Remediation Engineering

Spring. 3 credits. Prerequisite: CEE 3410. Next offered 2011–2012. T. D. O'Rourke. Covers the principles of hydrogeology, contaminant migration, and remediation technologies related to geotechnical and environmental engineering. Emphasizes environmental site assessment, site feasibility studies, selection of remediation procedures, and engineered landfills. Design problems are based on real projects and involve visits from practicing engineers.]

[CEE 4510 Microbiology for Environmental Engineering

Fall. 3 credits. Prerequisites: two semesters of college chemistry; organic chemistry or permission of instructor. Next offered 2010–2011. R. E. Richardson. Introduction to the fundamental aspects of microbiology and biochemistry that are pertinent to environmental engineering and science. Provides an overview of the characteristics of Bacteria, Archaea, unicellular

Eukaryotes (protozoa, algae, fungi), and viruses. Includes discussions of cell structure, bioenergetics and metabolism, and microbial genetics. Focus is then applied to topics pertinent to environmental engineering: pathogens; disease and immunity; environmental influences on microorganisms; roles of microbes in the carbon, nitrogen, and sulfur cycles; enzymes; bioremediation, bio-energy, molecular microbiology; and microbial ecology. This is an introductory course and is inappropriate for those who have taken BIOMI 2900 or equivalent.]

[CEE 4520 Water Supply Engineering

Fall. 3 credits. Prerequisite: CEE 3510. Next offered 2010–2011. J. J. Bisogni. Analysis of contemporary threats to human health from water supplies. Covers criteria and standards for potable-water quality; water-quality control theory; design of water supply facilities.]

CEE 4530 Laboratory Research in Environmental Engineering

Fall. 3 credits. Prerequisite: CEE 3510 or permission of instructor. Staff. Laboratory investigations of reactor flow characteristics; acid rain/lake chemistry; contaminated soil-site assessment and remediation; and wastewater treatment. Design of laboratory experiments, data analysis, computerized process control, and model development are emphasized.

CEE 4540 Sustainable Small-Scale Water Supplies

Fall. 3 credits. M. L. Weber-Shirk. This course covers the design and analysis of small-scale drinking water supply systems. We explore the technical, economic, and social constraints that form the sustainable space—i.e., the set of viable technologies that could be adopted progressively to improve the availability and quality of water. Students work in teams to design water supply and treatment systems.

CEE 4550 AguaClara: Sustainable Water Supply Project

Fall, spring. 3 credits. Pre- or corequisite: CEE 4540 or CEE 3310 or permission of instructor. Meets with CEE 2550. M. L. Weber-Shirk. Student teams conduct research, build working models, design full-scale prototypes, create design algorithms, and create educational materials for technology transfer to improve drinking water quality in Honduras. For more information see aguaclara.cee.cornell.edu.

[CEE 4610 Urban Transportation Planning and Modeling]

CEE 4630 Future Transportation Technologies and Systems

Fall. 3 credits. F. Vanek. Improving the use of existing facilities transportation infrastructure has become an important objective in transportation engineering and planning. Examines the role of information technologies for effective infrastructure utilization and planning. Focuses specific attention on analyses paradigms to evaluate the benefits of information technologies in transportation systems.

CEE 4640 Transportation Systems Design

Spring. 3 credits. Prerequisites: CEE 3610 and CEE 4060 or permission of instructor. M. A. Turnquist.

Analysis of capacity and operational design of transportation systems, including analytical modeling techniques underlying design criteria. Evaluation of alternative designs. Management and operating policies, including congestion pricing. Facility location decisions, networks, and investment strategies.

CEE 4650 Transportation, Energy, and Environment Systems for Sustainable Development

Spring. 3 credits. Prerequisites: CEE 3610 or permission of instructor. H. O. Gao.
For description, see CEE 6650.

CEE 4710 Fundamentals of Structural Mechanics

Fall. 3 credits. Prerequisites: ENGRD 2020, MATH 2940. M. D. Grigoriu.

Topics include beam bending; beams on elastic foundations; stability analysis for columns and beam-columns; linear elasticity; numerical solutions for linear elasticity problems; and applications including stress concentration, torsion, and plates.

CEE 4720 Introduction to the Finite Element Method

Fall. 3 credits. Prerequisites: CEE 3710, 3720, and 4710. P. Koutsourelakis.

Covers the formulation of the finite element method in 2-D and 3-D continuum, basic 2-D and 3-D continuum isoparametric elements, modeling and programming aspects of the finite element method, and static and transient problems. A large part of the course is devoted to understanding element formulations, testing elements (patch test), and addressing problems such as shear and volumetric locking, among others. Emphasis is placed on understanding fundamental aspects of the method for making intelligent use of commercial software and obtaining a strong background for moving to further study and research.

CEE 4730 Design of Concrete Structures

Fall. 4 credits. K. C. Hover.

Centered on the design of a multi-story building that is initially planned with masonry bearing walls and precast-prestressed concrete floors. The masonry walls are then replaced with steel beams and columns. In the next phase the precast concrete is replaced with cast-in-place reinforced concrete. Finally, the structural steel elements will be replaced with a reinforced concrete framing system. The course explore gravity loads, wind loads, and earthquake loads, and the behavior of individual members and the structure as a whole.

CEE 4740 Introduction to the Behavior of Metal Structures

Spring. 4 credits. Prerequisite ENGRD 2020 or permission of instructor. C. Earls.

An introductory course focused on the use of solid and structural mechanics to quantify elementary behavior of metal structures in order to enable design. The course is project focused; with the students preparing a complete and detailed design deliverable. The course will consider applications from civil structures, naval architecture, and aerospace engineering.

CEE 4750 Concrete Materials and Construction

Spring. 3 credits. K. C. Hover.
Covers the materials science, structural engineering, and construction technology involved in the materials aspects of the use of concrete. Topics include cement chemistry

and physics, mix design, admixtures, engineering properties, testing of fresh and hardened concrete, and the effects of construction techniques on material behavior.

[CEE 4760 Evaluation and Failure of Structures

Spring. 3 credits. Prerequisites: ENGRD 2020, 2610, and 2030; CEE 3710 and 4730.
Next offered 2011–2012 Staff.

This course teaches material and structural evaluation through the lens of failure. The course builds upon and integrates what students have learned in courses in physics, mechanics, dynamics, materials science, structural modeling/analysis, and design. In addition, the course teaches the physics of methods used for condition assessment of structures (e.g., stress wave propagation, electromagnetic wave propagation, heat flow), introduces students to structural damage and assessment of damage caused by earthquake/wind loads on structures, and introduces students to blast/impact loadings on structures and the concept of progressive collapse.]

CEE 4770 Introduction to Composite Materials (also MAE/TAM 4550, MSE 5550)

Fall. 3 credits. P. Petrina.
For description, see TAM 4550.

CEE 4780 Structural Dynamics and Earthquake Engineering

Spring. 3 credits. Enrollment limited to juniors and seniors. M. D. Grigoriu.
Covers modal analysis, numerical methods, and frequency-domain analysis. Introduction to earthquake-resistant design.

CEE 4810 LRFD-Based Engineering of Wood Structures (also BEE 4791)

Spring. 3 credits. Prerequisite: ENGRD 2020. K. Gebremedhin.
For description, see BEE 4810 under "College of Agriculture and Life Sciences."

CEE 4920 Engineers for a Sustainable World: Engineering in International Development

Fall. 3 credits. Prerequisite: senior or graduate standing; juniors need permission of instructor. F. Vanek and P. Doing.
Engineering-based group service projects offer real-life engineering research and design experience, from problem formulation through implementation. They may be international or local and may relate to any kind of engineering. Students work on interdisciplinary teams with a project supervisor and a partner community organization. Course readings and a writing assignment cover the relationship between engineering and international development, the philosophy and politics of technology, and ethics in engineering practice.

CEE 5021–5022 Design Project

Fall, spring. 3 credits each semester.
Requirement for students in M.Eng. (civil and environmental) program. Staff.
CEE design projects present students with an exemplary design experience that reflects those carried out in the course of professional practice. Projects are typically performed by student design groups, and the topics reflect the diverse specialty areas of the civil and environmental engineering field as described below.

CEE 5021–5022 Project in Environmental and Water Resources Systems

CEE 5031–5032 Project in Environmental Fluid Mechanics and Hydrology
Staff.

CEE 5041–5042 Project in Geotechnical Engineering

F. H. Kulhawy.
Design of major geotechnical engineering project. Planning and preliminary design during fall semester; final design completed in January intersession.

CEE 5051–5052 Agua Clara: Sustainable Water Supply Project

M. Weber-Shirk.
For more information, see aguaclara.cee.cornell.edu.

CEE 5061–5062 Project in Transportation Engineering

Systems analysis of a substantial transportation service.

CEE 5071–5072 Project in Structural Engineering

C. Earls.
A project-centered course focusing on the design of a major engineering structure. Planning and a preliminary design are completed during the fall semester; the comprehensive final design is completed in the January intersession.

CEE 5073–5074 Project in Civil Engineering Materials

Staff.
CEE 5081–5082 Project in Civil Infrastructure Systems
Staff.

Analysis of a problem in civil infrastructure.

CEE 5240 Applied Systems Engineering (also CIS 5040, ECE/ORIE 5120, MAE 5910, SYSEN 5100)

Fall. 3 credits. Prerequisite: senior or graduate standing in engineering field; concurrent or recent (past two years) enrollment in group-based project with strong system design component approved by course instructor. A. R. George and R. Roundy.
For description, see SYSEN 5100.

CEE 5252 System Architecture, Behavior, and Optimization (also CIS 5050, ECE 5130, ORIE 5142, MAE 5920, SYSEN 5200)

Spring. 3 credits. Prerequisite: CEE 5240/CS 5040, ECE/ORIE 5120, MAE 5910, or SYSEN 5200). Staff.
For description, see SYSEN 5200.

CEE 5290 Heuristic Methods for Optimization (also CS 5722, ORIE 5340)

Fall. 3 or 4 credits. Prerequisites: graduate standing or CS, ENGRD 2110 or 3510; ENGRD 3200 or permission of instructor. C. A. Shoemaker.
Teaches heuristic search methods including simulated annealing, tabu search, genetic algorithms, derandomized evolution strategy, and random walk developed for optimization of combinatorial- and continuous-variable problems. Application project options include wireless networks, protein folding, job shop scheduling, partial differential equations, satisfiability, or independent projects. Statistical methods are presented for comparing algorithm results. Advantages and disadvantages of heuristic search methods for

both serial and parallel computation are discussed in comparison with other optimization algorithms.

CEE 5900 Project Management

Fall, spring. 4 credits. Prerequisite: permission of instructor. F. J. Wayno. Core graduate course in project management for people who will manage technical or engineering projects. Focuses both on the "technical" tools of project management (e.g., methods for planning, scheduling, and control) and the "human" side (e.g., forming a project team, managing performance, resolving conflicts), with somewhat greater emphasis on the latter.

CEE 5910 Engineering Management Project

Fall. 4 credits. Prerequisite: permission of instructor. Staff. Intensive evaluation of the management aspects of a major engineering project or system. Most students work on a large group project in the area of project management, but students may also work singly or in small groups on an engineering management topic of special interest to them.

CEE 5920 Engineering Management Project

Spring. 4 credits. Prerequisite: permission of instructor. Staff. Continuation of CEE 5910.

CEE 5930 Engineering Management Methods

Spring. 4 credits. Prerequisites: CEE 3230 and 3040 or equivalent. M. A. Turnquist. Methods for managing data and transforming data into information. Modeling as a means to synthesize information into knowledge that can form the basis for decisions and actions. Application of statistical methods and optimization to managerial problems in operations, forecasting, and resource allocation.

[CEE 5940 Economic Methods for Engineering and Management (also ECON 4940)]

CEE 5950 Construction Planning and Operations

Fall. 3 credits. P. G. Carr. The course prepares students for responsibilities in overseeing the engineering and management of construction; on time—on budget. Emphasis is placed on the management processes for organizing, planning, and controlling the activities of complex development and construction programs. Students study the contracts for engineering, architecture, and construction; focusing on cost estimation and schedule control, responsibilities and risks, and the relationships among owners, designers, contractors, and suppliers. The potential for project disruption is discussed with special emphasis on dispute resolution methods.

[CEE 5960 Management Issues in Forensic Engineering

Fall. 3 credits. Next offered 2011–2012. P. G. Carr. Introduction to management issues in forensic engineering, contract administration, and dispute resolution, with particular emphasis on contract formation, performance, breach, and remedies. Through case studies in forensics, the engineer's standard of care and design obligations are explored. The engineer's technical and ethical duties to the

client, the contractors, and the public are examined.]

CEE 5970 Risk Analysis and Management (also TOX 5970)

Spring. 3 credits. Prerequisite: introduction to probability and statistics (e.g., CEE 3040, ENGRD 2700, ILRST 2100, BTRY 3010, or AEM 2100); two semesters of calculus; senior or graduate standing or permission of instructor. J. R. Stedinger.

Develops a working knowledge of risk terminology and reliability engineering, analytic tools and models used to analyze safety, environmental and technological risks, and social and psychological risk issues. Discussions address life risks in the United States historical accidents, natural hazards, threat assessment, transportation risks, industrial accidents, waste incineration, air pollution modeling, public health, regulatory policy, risk communication, and risk management.

[CEE 5980 Intro to Decision Analysis

Fall. 3 credits. Prerequisite: introduction to probability and statistics course such as CEE 3040, ENGRD 2700, ILRST 2100, BTRY 3010, or AEM 2100; seniors and graduate students or permission of instructor. Next offered 2011–2012. L. K. Nozick.

Framework to structure the way we think about decision situations that are complicated by uncertainty, complexity, and competing objectives. Specific decision-analysis concepts and tools, such as decision trees, sensitivity analysis, value of information, and utility theory. Applications to all areas of engineering and life. Includes a group project to analyze a real-world decision.]

[CEE 6000 Numerical Methods for Engineers]

CEE 6015 Special Topics—Remote Sensing

On demand. 1–6 credits. W. D. Philpot. Students may elect to undertake a project in remote sensing. The work is supervised by a professor in this subject area.

CEE 6020 Environmental Seminar

Fall. 1 credit. Staff. Presents topics of current interest.

CEE 6021 Seminar—Environmental and Water Resources Systems Analysis

Spring. 1 credit. Prerequisite: permission of instructor. C. A. Shoemaker and J. R. Stedinger.

Graduate students and faculty members give informal lectures on various topics related to ongoing research in environmental or water resources systems planning and analysis.

CEE 6025 Special Topics in Environmental and Water Resources Systems Analysis

Offered on demand. 1–6 credits. Staff. Supervised study, by individuals or small groups, of one or more specialized topics not covered in regular courses.

CEE 6030 Seminar—Environmental Fluid Mechanics/Hydrology

Spring. 1 credit. Requirement for graduate students majoring in hydraulics or hydraulic engineering. Open to undergraduates and graduates. P. J. Diamessis.

Topics of current interest in fluid mechanics, hydraulic engineering, and hydrology.

CEE 6035 Special Topics in Hydraulics

On demand. 1–6 credits. Staff. Special topics in fluid mechanics, hydraulic engineering, or hydrology.

CEE 6045 Special Topics in Geotechnical Engineering

On demand. 1–6 credits. Staff. Supervised study of special topics not covered in the formal courses.

CEE 6051 Seminar—Environmental Quality Engineering

Spring. 1 credit. Prerequisite: graduate students in environmental engineering. J. M. Gossett.

Presentation and discussion of current research in environmental engineering.

CEE 6055 Special Topics in Environmental Engineering

On demand. 1–6 credits. Staff. Supervised study in special topics not covered in formal courses.

CEE 6060 Seminar—Transportation System Engineering

Fall, spring. 1 credit. Staff. Presents topics of current interest.

CEE 6065 Special Topics in Transportation

On demand. 1–6 credits. Staff. Advanced subject matter not covered in depth in other regular courses.

CEE 6070 Seminar—Civil Infrastructure

Fall, spring. 1 credit. Requirement for first-year graduate students. P. Koutsourelakis. Presents topics of current interest.

CEE 6075 Special Topics in Structural Engineering

On demand. 1–6 credits. Staff. Individually supervised study or independent design or research in specialized topics not covered in regular courses. Occasional offering of such special courses as Shell Theory and Design, and Advanced Topics in Finite Element Analysis.

CEE 6090 Seminar—Engineering Systems and Management

Fall, spring. 1 credit. Staff. Presents topics of current interest.

CEE 6095 Special Topics in Engineering Management

On demand. 1–6 credits. Staff. Individually supervised study of one or more specialized topics not covered in regular courses.

CEE 6100 Remote Sensing Fundamentals (also CSS 6100)

Fall. 3 credits. W. D. Philpot. Introduction to the principles, equipment, and methods used in obtaining information about earth resources and the environment from aircraft or satellite sensors. Topics include basic interactions of electromagnetic radiation with the earth, sensors, sensor and ground-data acquisition, data analysis and interpretation, and project design in the form of a proposal to use remote sensing for a specific application.

CEE 6150 Digital Image Processing

Spring. 3 credits. W. D. Philpot. An introduction to digital image-processing concepts and techniques, with emphasis on remote-sensing applications. Topics include image acquisition, enhancement procedures, spatial and spectral feature extraction, and classification, with an introduction to

hyperspectral data analysis. Assignments require the use of image-processing software and graphics.

[CEE 6200 Water-Resources Systems Engineering]

Spring, 3 credits. Prerequisites: CEE 3230 and 5930 or BEE 4750. Next offered 2010–2011. D. P. Loucks.

Development and application of deterministic and stochastic optimization and simulation models for aiding in water-resources planning and management. Covers river-basin modeling, including water allocation to multiple purposes, reservoir design and operation, irrigation planning and operation, hydropower-capacity development, flow augmentation, flood control and protection, ecological habitat restoration, and water-quality prediction and control.]

CEE 6210 Stochastic Hydrology

Spring, 3 credits. Prerequisites: CEE 3040 or permission of instructor. Offered on demand. J. R. Stedinger.

Course examines statistical, time series, and stochastic optimization methods used to address water resources planning and management problems involving uncertainty objectives and hydrologic inputs. Statistical issues include maximum likelihood and moments estimators; censored data sets and historical information; probability plotting; Bayesian inference; regionalization methods; ARMA models; multivariate stochastic streamflow models; stochastic simulation; and stochastic reservoir-operation optimization models.

[CEE 6230 Environmental Quality Systems Engineering]

Fall, 3 credits. Prerequisites: MATH 2940, optimization, and graduate standing or permission of instructor. Next offered 2012–2013. C. A. Shoemaker.

Applications of optimization, simulation methods, and uncertainty analysis to the prevention and remediation of pollution. Case studies include regional waste and wastewater treatment, restoration of dissolved oxygen levels in rivers, and reclamation of contaminated groundwater. Applications use linear programming, integer, dynamic, nonlinear programming, and sensitivity analysis.]

CEE 6300 Spectral Methods for Incompressible Fluid Flows

Fall, 4 credits. P. J. Diamessis.

An introduction to the fundamental building blocks of flow solvers for the simulation of incompressible flow processes in the natural environment. The course will focus on higher-order element-based discretization schemes (Fourier, spectral element, spectral collocation, discontinuous Galerkin, and penalty methods). Course themes are centered around linear advection-diffusion, nonlinearity effects, pressure projection methods, the role of stratification, and the design of robust boundary and initial conditions. All these elements are blended together to build a two-dimensional incompressible Navier-Stokes solver.

CEE 6310 Computational Simulation of Flow and Transport in the Environment

Spring, 3 credits. Prerequisites: MATH 2940 or equivalent, ENGRD 3200 or experience in numerical methods and programming, and elementary fluid mechanics. Staff.

Covers fundamental equations of saturated and unsaturated flow in porous media; flow in fractured media; numerical modeling of transport in porous media; diffusion and advective diffusion in one, two, and three dimensions; anisotropy; and additional terms for reactive substances. Teaches various numerical methods including finite difference, finite elements, and boundary elements.

CEE 6320 Hydrology

Spring, 3 credits. Prerequisite: CEE 3310. W. H. Brutsaert.

Introduction to hydrology as a description of the water cycle and the role of water in the natural environment, and other issues for environmental engineers and scientists. Covers physical and statistical prediction methods for design related to hydrologic processes; hydrometeorology and evaporation; infiltration and base flow; surface runoff and channel routing; linear and nonlinear hydrologic systems; and storage routing and unit hydrograph methods.

CEE 6330 Flow in Porous Media and Groundwater

Fall, 3 credits. Prerequisite: CEE 3310.

Offered on demand; please contact professor if interested. W. H. Brutsaert. Fluid mechanics and equations of single-phase and multiphase flow; methods of solution. Applications involve aquifer hydraulics, pumping wells; drought flows; infiltration, groundwater recharge; land subsidence; seawater intrusion, miscible displacement; and transient seepage in unsaturated materials.

CEE 6340 Boundary Layer Meteorology

Fall, 3 credits. Prerequisite: CEE 3310 or permission of instructor. Offered on demand; please contact professor if interested. W. H. Brutsaert.

Physical processes in the lower atmospheric environment: turbulent transport in the atmospheric boundary layer, surface-air interaction, disturbed boundary layers, radiation. Applications include sensible and latent heat transfer from lakes, plant canopy flow and evapotranspiration, turbulent diffusion from chimneys and cooling towers, and related design issues.

CEE 6350 Small and Finite Amplitude Water Waves

Spring, 3 credits. Offered on demand; please contact professor if interested. P. L.-F. Liu.

Reviews linear and nonlinear theories of ocean waves. Discusses the applicability of different wave theories to engineering problems.

CEE 6360 Environmental Fluid Mechanics

Spring, 3 credits. Offered on demand; please contact professor if interested. E. A. Cowen.

Covers analytic and modeling perspectives of environmental flows; mechanics of layered and continuously stratified fluids: internal waves, density currents, baroclinic motions, and turbulence; jets and plumes and their behavior in the environment; turbulent diffusion, shear flow dispersion, and wave-induced mixing processes; and applications to mixing processes in rivers, lakes, estuaries, and the coastal ocean.

CEE 6370 Experimental Methods in Fluid Dynamics (also MAE 6270)

Spring, 4 credits. Pre- or corequisites: CEE 3310 or equivalent and CEE 3040 or equivalent. E. A. Cowen.

Introduction to experimental data collection and analysis, in particular as they pertain to fluid flows. Covers computer-based experimental control, analog and digital data acquisition, discrete sampling theory, digital signal processing, uncertainty analysis. Also covers analog transducers, acoustic and laser Doppler velocimetry, full-field (2-D) quantitative imaging techniques. Includes laboratory experiments and a project.

CEE 6400 Foundation Engineering

Spring, 3 credits. Prerequisite: CEE 3410. F. H. Kulhawy.

Covers soil exploration, sampling, and in-situ testing techniques; bearing capacity, stress distribution, and settlement; design of shallow and deep foundations; compaction and site preparation; and seepage and dewatering of foundation excavations.

CEE 6410 Retaining Structures and Slopes

Fall, 3 credits. Prerequisite: CEE 3410. T. D. O'Rourke.

Covers Earth pressure theories; design of rigid, flexible, braced, tied-back, slurry wall, soil nailing, and reinforced soil structures; stability of excavation, cut, and natural slopes; and design problems stressing application of course material under field conditions of engineering practice.

[CEE 6440 Environmental Site and Remediation Engineering]

Spring, 3 credits. Prerequisite: CEE 3410 or equivalent or permission of instructor. Next offered 2011–2012. T. D. O'Rourke.

Covers principles of hydrogeology, contaminant migration, and remediation technologies related to geotechnical and environmental engineering. Emphasizes environmental site assessment, site feasibility studies, selection of remediation procedures, and engineered landfills. Design problems are based on real projects and involve visits from practicing engineers.]

CEE 6530 Water Chemistry for Environmental Engineering

Fall, 3 credits. Prerequisite: one semester of college chemistry or permission of instructor. J. M. Gossett.

Covers principles of chemistry applicable to the understanding, design, and control of water and wastewater treatment processes and to reactions in receiving waters. Topics include chemical thermodynamics, reaction kinetics, acid-base equilibria, mineral precipitation/dissolution, and electrochemistry. Focuses on the mathematical description of chemical reactions relevant to engineered processes and natural systems, and the numerical or graphical solution of these problems.

[CEE 6540 Aquatic Chemistry]

Spring, 3 credits. Prerequisite: CEE 6530 or CHEM 2870–2880. Next offered 2011–2012. J. J. Bisogni.

Applies concepts of chemical equilibria to natural aquatic systems. Topics include acid-base reactions, buffer systems, mineral precipitation, coordination and redox reactions, Eh-pH diagrams adsorption phenomena, humic acid chemistry, and chemical-equilibria computational techniques. In-depth coverage of topics covered in CEE 6530.]

CEE 6550 Transport, Mixing, and Transformation in the Environment

Fall, 3 credits. Prerequisite: CEE 3310. Staff.

Application of fluid mechanics to problems of transport, mixing, and transformation in the water environment. Introduction to advective, diffuse, and dispersive processes in the environment. Boundary interactions: air-water and sediment-water processes. Introduction to chemical and biochemical transformation processes. Applications to transport, mixing, and transformation in rivers, lakes, and coastal waters.

CEE 6560 Physical/Chemical Process

Fall. 3 credits. Pre- or corequisite: CEE 6530 or permission of instructor.

J. J. Bisogni.

Theoretical and engineering aspects of chemical and physical phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes and to their transformation in the environment. Analysis and design of treatment processes and systems.

CEE 6570 Biological Processes

Spring. 3 credits. Prerequisites: introductory microbiology and CEE 6560, or permission of instructor. J. M. Gossett.

Theoretical and engineering aspects of biological phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes and to their transformation in the environment. Bioenergetics analysis, stoichiometry, biokinetic, and design of biological treatment process.

[CEE 6580 Biodegradation and Biocatalysis

Spring. 3 credits. Prerequisites: CEE 4510 or BIOMI 2900 or equivalent; CEE 3510 or CHEME 3900 or permission of instructor.

Next offered 2010–2011. R. E. Richardson.

Students explore the use of microbes in biodegradation and biocatalysis as well as the molecular techniques (i.e., analysis of DNA, RNA, and proteins) commonly used in these applications. Lectures cover enzyme classes and kinetics, selective isolation of organisms with desired bioconversion capabilities, effects of environmental parameters and cell-to-cell communication on gene expression, methods in microbial molecular biology, and contemporary case studies in biodegradation and biocatalysis. Laboratory sessions give students hands-on experience in molecular and analytical methods. Student teams design and then construct a bioreactor employing their own environmental isolates that degrade a selected contaminant or produce a desired compound.]

[CEE 6610 Urban Transportation Planning and Modeling]

CEE 6620 Urban Transportation Network Design and Analysis

Fall. 3 credits. Prerequisite: CEE 3610 or permission of instructor. L. K. Nozick.

Covers the development and use of mathematical models for the design and analysis of urban transportation networks, including formulations and solution procedures for deterministic user equilibrium and stochastic user equilibrium. Students apply these tools to a substantive real-world case study and estimation of origin–destination tables.

[CEE 6630 Network Flows and Algorithms

Spring. 3 credits. Prerequisite: CEE 6620 or permission of instructor. Offered alternate years; next offered 2010–2011.

M. A. Turnquist.

Algorithms for network flow problems encountered in transportation systems modeling, including shortest path, multi-objective shortest path, minimum cost flows, multi-commodity flows, and generalized flows. Applications to vehicle routing, dynamic vehicle allocation, and network design.]

CEE 6650 Transportation, Energy, and Environment Systems for Sustainable Development

Spring. 3 credits. Prerequisites: CEE 3610 or permission of instructor. H. O. Gao.

The course focuses on the nexus of transportation and environment, energy, and climate-change concerns. It is interdisciplinary, drawing upon transportation, environment, urban planning, statistics, economics, and policy. The course covers both the theoretical and practical aspects of relevant topics including mobile emissions inventory estimation, renewable fuels, air quality impact and life cycle benefit assessment of alternative fuels/vehicles, Intelligent Transportation Systems (ITS) and urban sprawl, and congestion mitigation and air quality (CMAQ). Students will apply course materials to real-world cases and projects.

CEE 6710 Fundamentals of Structural Mechanics

Fall. 3 credits. Prerequisites: ENGRD 2020, MATH 2940. M. D. Grigoriu.

Topics include beam bending; beams on elastic foundations; stability analysis for columns and beam-columns; linear elasticity; numerical solutions for linear elasticity problems; and applications including stress concentration, torsion, and plates.

CEE 6720 Introduction to the Finite Element Method

Fall. 3 credits. Prerequisites: CEE 3710, 3720, and 4710. P. Koutsourelakis.

Covers the formulation of the finite element method in 2-D and 3-D continuum, basic 2-D and 3-D continuum isoparametric elements, modeling and programming aspects of the finite element method, and static and transient problems. A large part of the course is devoted to understanding element formulations, testing elements (patch test), and addressing problems such as shear and volumetric locking, among others. Emphasis is placed on understanding fundamental aspects of the method for making intelligent use of commercial software and obtaining a strong background for moving to further study and research.

CEE 6730 Design of Concrete Structures

Fall. 4 credits. Prerequisite: CEE 3710 or permission of instructor. K. C. Hover.

Centered on the design of a multi-story building that is initially planned with masonry bearing walls and precast-prestressed concrete floors. The masonry walls are then replaced with cast-in-place reinforced concrete. Finally, the structural steel elements are replaced with a reinforced concrete framing system. The course explores gravity loads, wind loads, and earthquake loads, and the behavior of individual members and the structure as a whole.

CEE 6750 Concrete Materials and Construction

Spring. 3 credits. K. C. Hover.

Covers the materials science, structural engineering, and construction technology involved in the materials aspects of the use of concrete. Topics include cement chemistry and physics, mix design, admixtures, engineering properties, testing of fresh and hardened concrete, and the effects of construction techniques on material behavior.

CEE 6760 Advanced Composite Materials (also TAM 6550, MAE/MSE 6550)

Spring. 4 credits. CEE 4770/MAE 4550/MSE 5550/TAM 4550 not a prerequisite but excellent background.

For description, see TAM 6550.

[CEE 6770 Engineering Analysis

Fall. 3 credits. Prerequisite: permission of instructor. Next offered 2011–2012.

M. D. Grigoriu.

Vector spaces, linear transformations, and eigenvalue problems with applications to matrix structural analysis, linear dynamics, stability, and principal stresses, strains, and moments of inertia. Fourier analysis for periodic and non-periodic functions, with applications to the solution of ordinary differential equations, beams, plates, and other structural mechanics problems. Partial differential equations with applications to the analysis of static and dynamic response of continuous systems and transport problems.]

CEE 6780 Structural Dynamics and Earthquake Engineering

Spring. 3 credits. M. D. Grigoriu.

Covers modal analysis, numerical methods, and frequency-domain analysis. Introduces earthquake-resistant design.

[CEE 6790 Evaluation and Failure of Structures]

CEE 6860 Civil Infrastructure Systems

Spring. 3 credits. Prerequisites: probability and statistics course (CEE 3040 or equivalent), or permission of instructor.

Recommended: engineering economics course (CEE 3230 or equivalent). S–U or letter grades. T. D. O'Rourke.

Introduction to the framing and solution of civil infrastructure problems using a systems engineering approach. Systems tools, such as optimization, life-cycle cost analysis, decision analysis, simulation, Markov modeling, and risk analysis, are examined through case studies related to civil infrastructure.

CEE 6900 Creativity, Innovation, and Leadership

Spring. 3 credits. Pre- or corequisite: CEE 5800 or permission of instructor.

F. J. Wayno.

Graduate course designed to help aspiring engineering managers to better understand individual creativity and organizational innovation and to develop the required skills to play a productive role in fostering both. Not incidentally, the course will also help students who take it to become more creative themselves. The course is highly participative and has a flow that moves from the individual—to the group—to the organization, with theory, research results, and practical skills-development woven seamlessly together.

CEE 6910 Principles of Project Leadership (also SYSEN 6910)

Spring. 3 credits. Prerequisite: permission of instructor. F. J. Wayno.

Core graduate course in project management for people who will manage technical or engineering projects. Focuses both on the "technical" tools of project management (e.g., methods for planning, scheduling, and control) and the "human" side (e.g., forming a project team, managing performance, resolving conflicts), with somewhat greater emphasis on the latter. Offered as a distance learning course only.

CEE 6930 Public Systems Modeling

Fall. 4 credits. D. P. Loucks.

An introduction to the art of model building and use, especially related to public sector planning and management issues. The course will focus on the quantitative systems approach for identifying and evaluating alternative possible decisions and their physical, economic, environmental, and social impacts. Modeling methods include various deterministic and probabilistic optimization and simulation models, decision analysis, evolutionary search algorithms, and statistical models applied to a variety of public sector issues. The aim of all of this "modeling technology" is to help us generate and communicate information that can assist and better inform public decision-making.

CEE 6940 Research in Engineering Management

On demand. 1–6 credits. Staff.

The student may select an area of investigation in engineering management. Results should be submitted to the instructor in charge in the form of a research report.

CEE 7010 Research—Remote Sensing

On demand. 1–6 credits. W. D. Philpot.

For students who want to study one particular area in depth. The work may take the form of laboratory investigation, field study, theoretical analysis, or development of design procedures.

CEE 7020 Environmental and Water Resources Systems Analysis Research

On demand. 1–6 credits. Prerequisite: permission of instructor. Preparation must be suitable to investigation to be undertaken. Staff.

Investigations of particular environmental or water resources systems problems.

CEE 7030 Research in Environmental Fluid Mechanics and Hydrology

On demand. 1–6 credits. Staff.

The student may select an area of investigation in fluid mechanics, hydraulic engineering, or hydrology. The work may be either experimental or theoretical in nature. Results should be submitted to the instructor in charge in the form of a research report.

CEE 7040 Research in Geotechnical Engineering

On demand. 1–6 credits. Staff.

For students who want to pursue a particular geotechnical topic in considerable depth.

CEE 7050 Research in Environmental Engineering

On demand. 1–6 credits. Staff.

For students who want to study a particular area in depth. The work may take the form of laboratory investigation, field study, theoretical analysis, or development of design and analysis procedures.

CEE 7070 Research in Structural Engineering

On demand. 1–6 credits. Staff.

Pursues a branch of structural engineering beyond what is covered in regular courses.

Theoretical or experimental investigation of suitable problems.

CEE 7073 Civil and Environmental Engineering Materials Project

On demand. 1–3 credits. Staff.

Individual projects or reading and study assignments involving engineering materials.

CEE 7360 Turbulence and Turbulent Mixing in Environmental Stratified Flows

Spring. 3 credits. Prerequisite: CEE 6550 or second course in fluid mechanics or with instructor's permission. Offered on demand; please contact professor if interested. P. J. Diamesis.

Fundamentals of stably stratified flows, stratified homogeneous turbulence (spectra, length scales, and timescales), kinematics of diapycnal mixing, basic turbulent flow processes in homogeneous and stratified fluids (shear layers, wakes, boundary layers, etc.), energy budget analysis, and parameterizations of geophysical turbulence. Additional topics may include fossil turbulence theory and vortex-internal wave decomposition in strongly stratified turbulence.

CEE 7400 Engineering Behavior of Soils

Fall. 3 credits. Prerequisite: CEE 3410.

H. E. Stewart.

Detailed study of the physiochemical nature of soil. Stress states due to geostatic loading and stress-history effects. In-depth evaluation of stress-strain-strength, compressibility, and hydraulic conductivity of natural soils.

CEE 7410 Rock Engineering

Fall. 3 credits. Prerequisite: CEE 3410 or permission of instructor. Recommended: introductory geology. T. D. O'Rourke.

Geological and engineering classifications of intact rock, discontinuities, and rock masses. Includes laboratory and field evaluation of properties. Covers stress states and stress analysis; design of foundations on, and openings in, rock masses; analysis of the stability of rock slopes; and rock blasting.

[CEE 7440 Advanced Foundation Engineering]

CEE 7450 Soil Dynamics

Spring. 3 credits. Prerequisite: permission of instructor. H. E. Stewart.

Study of soil behavior under dynamic loading conditions. Foundation design for vibratory loadings. Introductory earthquake engineering including field and laboratory techniques for determining dynamic soil properties and liquefaction potential. Covers design of embankments and retaining structures under dynamic loading conditions.

[CEE 7460 Embankment Dam Engineering]

Spring. 2 credits. Prerequisites: CEE 6410 and 7410, or permission of instructor. Next offered 2011–2012. F. H. Kulhawy.

Principles of analysis and design for earth and rockfill dams. Materials, construction methods, internal and external stability, seepage and drainage, performance monitoring, abutment and foundation evaluation. Introduction to tailings dams.]

CEE 7620 Practicum in Modeling Transportation Systems

Fall. 3 credits. Prerequisites: CEE 6610, 6620, and 6630. L. K. Nozick.

CEE 7700 Engineering Fracture Mechanics

Spring. 3 credits. Prerequisite: CEE 6720 or equivalent and TAM 7530, or permission of instructor. A. Ingrassia.

Computational and physical modeling of crack growth processes. Finite and boundary element-based simulation of brittle fracture initiation and propagation, fatigue crack growth, and elasto-plastic and cohesive approaches to inelastic crack growth. Element formulation, meshing and remeshing, interactive steering. Case studies across scales from geomechanics to micromechanics, and including metals, ceramics, and polymers. Laboratory techniques for fracture toughness, crack growth rate, and trajectory testing.

[CEE 7710 Stochastic Mechanics in Science and Engineering]

Fall. 3 credits. Prerequisite: permission of instructor. Next offered 2011–2012.

M. D. Grigoriu.

Review of probability theory, stochastic processes, and Ito formula with illustrations by Monte Carlo Simulation. Analytical and numerical methods for solving stochastic problems defined by algebraic, differential, and integral equations with random/deterministic coefficients and random/deterministic input. Applications include solution of Laplace, transport, Schrodinger, and other deterministic partial differential equations; dynamic systems subjected to Gaussian and non-Gaussian noise; random eigenvalue problems; and homogenization, structure evolution, and pattern formation for random heterogeneous materials.]

[CEE 7720 Random Vibration]

Fall. 3 credits. Prerequisites: MAE 3260 and ENGRD 2700, or equivalent, and permission of instructor. Next offered 2011–2012. M. D. Grigoriu.

Reviews random-process theory, simulation, and first-passage time. Linear random vibration: second-moment response descriptors and applications from fatigue; seismic analysis; and response to wind, wave, and other non-Gaussian load processes. Nonlinear random vibration: equivalent linearization, perturbation techniques, Fokker-Planck and Kolomogorov equations, Itô calculus, and applications from chaotic vibration, fatigue, seismic analysis, and parametrically excited systems.]

[CEE 7730 Structural Reliability]

Fall. 3 credits. Prerequisite: permission of instructor. Next offered 2011–2012.

M. D. Grigoriu.

Review of probability theory, practical measures for structural reliability, second-moment reliability indices, probability models for strength and loads, probability-based design codes, reliability of structural systems, imperfection-sensitive structures, fatigue, stochastic finite-element techniques, and elementary concepts of probabilistic fracture mechanics.]

CEE 7740 Advanced Structural Concrete

Fall. 3 credits. K. C. Hover.

Covers the fundamental aspects of the mechanical behavior of concrete subjected to axial and multiaxial states of stress, rate effects, time-dependent deformations, and multiscale modeling. Includes the behavior of reinforced concrete membrane elements subjected to plane states of stress, torsion, limit analysis, and gives an introduction to finite element modeling of reinforced concrete structures.

CEE 7750 Nonlinear Finite Element Analysis

Spring, 3 credits. Next offered 2010–2011. W. Aquino.

Covers fundamental aspects of nonlinear finite element analysis including geometric and material nonlinearity. Also covers total and updated Lagrangian formulations, implementation of constitutive models, numerical solutions of global nonlinear systems of equations, and regularization techniques for softening materials.]

CEE 7760 Advanced Topics in Stability

Spring, 3 credits. Prerequisite: CEE 3740 or equivalent. Next offered 2011–2012. C. Earls.]

CEE 7770 Advanced Concepts in Finite Element Methods

Spring, 3 credits. W. Aquino.

The main objective of this course is to introduce the student to modern techniques used for solving partial differential equations using finite element methods. In addition, half of the course will be devoted to advanced programming techniques to produce fast and robust finite element computer codes. The course will cover formal mathematical formulations of the finite element method using function spaces, extensions of the finite element method, optimization of continuous systems, object-oriented implementations, and an introduction to multilevel techniques such as multigrid and domain decomposition.

CEE 7790 Nonlinear Finite Element Analysis II

Fall, 4 credits. Prerequisite CEE 6720 (or equivalent). C. Earls.

An advanced course in finite element analysis emphasizing the nonlinear solution of problems involving solids and structures (with a special emphasis on the latter). The formulation of nonlinear structural elements, the development of efficient and robust means for treating material nonlinearity, and the nonlinear solution of finite element systems are fundamental topics treated in this course. Topics from structural stability, problems involving coupled physics, and those involving transient dynamical response, will also be treated. The primary out-of-class effort centers on a significant project, and all students will be required to write their own nonlinear finite element code in support of this. As a result, some experience with programming is required.

CEE 8100 Thesis—Remote Sensing

Fall, spring, 1–12 credits. Students must register for credit with professor at start of each semester. W. D. Philpot.

The student selects a thesis research topic with the advice of the faculty member in charge and pursues it either independently or in conjunction with others working on the same topic.

CEE 8200 Thesis—Environmental and Water Resource Systems

Fall, spring, 1–12 credits. Students must register for credit with professor at start of each semester. Staff.

The student selects a thesis research topic with the advice of the faculty member in charge and pursues it either independently or in conjunction with others working on the same topic.

CEE 8300 Thesis—Environmental Fluid Mechanics and Hydrology

Fall, spring, 1–12 credits. Students must register for credit with professor at start of each semester. Staff.

The student selects a thesis research topic with the advice of the faculty member in charge and pursues it either independently or in conjunction with others working on the same topic.

CEE 8400 Thesis—Geotechnical Engineering

Fall, spring, 1–12 credits. Students must register for credit with professor at start of each semester. Staff.

The student selects a thesis research topic with the advice of the faculty member in charge and pursues it either independently or in conjunction with others working on the same topic.

CEE 8500 Thesis—Environmental Engineering

Fall, spring, 1–12 credits. Students must register for credit with professor at start of each semester. Staff.

The student selects a thesis research topic with the advice of the faculty member in charge and pursues it either independently or in conjunction with others working on the same topic.

CEE 8600 Thesis—Transportation Systems Engineering

Fall, spring, 1–12 credits. Students must register for credit with professor at start of each semester. Staff.

The student selects a thesis research topic with the advice of the faculty member in charge and pursues it either independently or in conjunction with others working on the same topic.

CEE 8700 Thesis—Structural Engineering

Fall, spring, 1–12 credits. Students must register for credit with professor at start of each semester. Staff.

The student selects a thesis research topic with the advice of the faculty member in charge and pursues it either independently or in conjunction with others working on the same topic.

CEE 8800 Thesis—Civil Infrastructure Systems

Fall, spring, 1–12 credits. Students must register for credit with professor at start of each semester. Staff.

The student selects a thesis research topic with the advice of the faculty member in charge and pursues it either independently or in conjunction with others working on the same topic.

COMPUTER SCIENCE

E. Tardos, chair; W. Arms, G. Bailey, K. Bala, D. Bindel, K. Birman, C. Cardie, R. L. Constable, D. Fan, P. Francis, J. Gehrke, C. Gomes, D. Greenberg, D. Gries, J. Halpern, J. E. Hopcroft, D. Huttenlocher, D. James, T. Joachims, J. Kleinberg, R. Kleinberg, C. Koch, D. Kozen, L. Lee, S. Marschner, A. Myers, R. Pass, F. B. Schneider, B. Selman, D. Shmoys, E. G. Sirer, N. Snavely, R. Teitelbaum, C. Van Loan, H. Weatherspoon, R. Zabih

The Department of Computer Science is part of the College of Arts and Sciences,

Computing and Information Science (CIS), and the College of Engineering. For complete course descriptions, see the Computer Science listing in the CIS section.

CS 1109 Fundamental Programming Concepts

Summer, 2 credits. Prerequisite: pre-freshman standing or permission of instructor. Credit may not be applied toward engineering degree. S–U grades only.

CS 1110 Introduction to Computing Using Java

Fall, spring, summer, 4 credits. Assumes basic high school mathematics (no calculus), but no programming experience.

CS 1112 Introduction to Computing Using MATLAB

Fall, spring, 4 credits. Corequisite: MATH 1110, 1910, or equivalent. Assumes student is comfortable with mathematics (at the level of one semester of calculus) but has no prior programming experience.

CS 1114 Introduction to Computing Using MATLAB and Robotics

Spring, 4 credits. Prerequisite: some programming experience.

CS 1130 Transition to Object-Oriented Programming

Fall, spring, 1 credit. Prerequisite: one course in programming. S–U grades only.

CS 1132 Transition to MATLAB

Fall, spring, 1 credit. Prerequisite: one course in programming. S–U grades only.

CS 1300 Introductory Design and Programming for the Web (also INFO 1300)

Fall, 4 credits.

For description, see INFO 1300 in CIS section.

CS 1610 Computing in the Arts (also CIS/ENGR 1610, DANCE 1540, FILM 1750, MUSIC 1465, PSYCH 1650)

Fall, 3 credits. Recommended: good comfort level with computers and some of the arts.

CS 1620 Visual Imaging in the Electronic Age (also ARCH 3702, ART 1700, CIS 1620, ENGR 1620)

Fall, 3 credits.

For description, see ART 1700.

CS 1710 Introduction to Cognitive Science (also COGST 1101, LING 1170, PHIL 1910, PSYCH 1102)

Fall, summer, 3 credits.

For description, see COGST 1101.

CS 2022 Introduction to C

Fall, spring, usually weeks 1–4. 1 credit.

Prerequisite: one programming course or equivalent programming experience. Credit granted for both CS 2022 and 2024 only if 2022 is taken first. S–U grades only.

CS 2024 C++ Programming

Fall, 2 credits. Prerequisite: one programming course or equivalent programming experience. Students who plan to take CS 2022 and 2024 must take 2022 first. S–U grades only.

CS 2026 Introduction to C#

Spring, usually weeks 5–8. 1 credit.

Prerequisite: CS/ENGRD 2110 or equivalent experience. S–U grades only.

CS 2042 Unix Tools

Fall, usually weeks 5–8. 1 credit.
Prerequisite: one programming course or equivalent programming experience. S–U grades only.

CS 2044 Advanced UNIX Programming and Tools

Spring, usually weeks 5–8. 1 credit.
Prerequisite: CS 2042 or equivalent. S–U grades only.

CS 2110 Object-Oriented Programming and Data Structures (also ENGRD 2110)

Fall, spring, summer. 3 credits. Prerequisite: CS 1110, CS 1130, or CS 1113 or (CS 1112 if completed before fall 2007) or equivalent course in Java or C++.

CS 2300 Intermediate Design and Programming for the Web (also INFO 2300)

Spring. 3 credits. Prerequisite: CS 1300 strongly recommended. Must be taken before CS 3300.

For description, see INFO 2300 in CIS section.

CS 2800 Discrete Structures

Fall, spring. 3 credits. Pre- or corequisite: one course in programming or permission of instructor.

CS 2850 Networks (also ECON/INFO 2040, SOC 2090)

Spring. 4 credits. Prerequisite: none.

For description, see ECON 2040.

CS 3110 Data Structures and Functional Programming

Fall, spring. 4 credits. Prerequisite: CS 2110 and 2111 or equivalent programming experience. Pre- or corequisite: CS 2800. Should not be taken concurrently with CS 3410 or 3420.

CS 3220 Introduction to Scientific Computation (also ENGRD 3220)

Spring, summer. 3 credits. Prerequisites: CS 1112 or 1132 and MATH 2220, 2230, or 2940.

CS 3300 Data-Driven Web Applications (also INFO 3300)

Spring. 3 credits. Prerequisite: CS/ENGRD 2110 and (CS 2300 or permission of instructor). CS majors may use only one of the following toward their degree: CS/INFO 3300 or CS 4321.

For description, see INFO 3300 in CIS section.

CS 3410 Systems Programming

Spring. 4 credits. Prerequisites: CS 2110 or equivalent programming experience. Should not be taken concurrently with CS 3110.

CS 3420 Computer Organization (also ECE 3140)

Spring. 4 credits. Prerequisite: CS 2110 or ENGRD 2300. Should not be taken concurrently with CS 3110.

For description, see ECE 3140.

CS 3740 Computational Linguistics (also COGST 4240, LING 4424)

Fall. 4 credits. Recommended: CS 2042.

For description, see LING 4424.

CS 3810 Introduction to Theory of Computing

Fall, summer. 3 credits. Prerequisite: CS 2800 or permission of instructor.

CS 4120 Introduction to Compilers

Fall. 3 credits. Prerequisites: CS 3110 or permission of instructor and CS 3420 or 3410. Corequisite: CS 4121.

CS 4121 Practicum in Compilers

Fall. 2 credits. Corequisite: CS 4120.

CS 4210 Numerical Analysis and Differential Equations (also MATH 4250)

Fall. 4 credits. Prerequisites: MATH 2210 or 2940 or equivalent, one additional mathematics course numbered 3000 or above, and knowledge of programming. For description, see MATH 4250.

CS 4220 Numerical Analysis: Linear and Nonlinear Equations (also MATH 4260)

Spring. 4 credits. Prerequisites: MATH 2210 or 2940 or equivalent, one additional mathematics course numbered 3000 or above, and knowledge of programming.

CS 4300 Information Retrieval (also INFO 4300)

Fall. 3 credits. Prerequisite: CS 2110 or equivalent.

For description, see INFO 4300 in CIS section.

CS 4302 Web Information Systems (also INFO 4302)

Spring. 3 credits. Prerequisites: CS 2110 and some familiarity with web site technology.

For description, see INFO 4302 in CIS section.

CS 4320 Introduction to Database Systems

Fall. 3 credits. Prerequisites: CS 3110 (or CS 2110, 2111 and permission of instructor).

CS 4321 Practicum in Database Systems

Fall. 2 credits. Pre- or corequisite: CS 4320. CS majors may use only one of the following toward their degree: CS/INFO 3300 or CS 4321.

CS 4410 Operating Systems

Fall. 3 credits. Prerequisite: CS 3410 or 3420.

CS 4411 Practicum in Operating Systems

Fall. 2 credits. Corequisite: CS 4410.

CS 4420 Computer Architecture (also ECE 4750)

Fall. 4 credits. Prerequisites: ENGRD 2300 and CS 3420/ECE 3140.

For description, see ECE 4750.

CS 4620 Introduction to Computer Graphics (also ARCH 3704)

Fall. 3 credits. Prerequisite: CS/ENGRD 2110.

CS 4621 Computer Graphics Practicum

Fall. 2 credits. Pre- or corequisite: CS 4620.

CS 4700 Foundations of Artificial Intelligence

Fall. 3 credits. Prerequisites: CS/ENGRD 2110 and CS 2800 or equivalent.

CS 4701 Practicum in Artificial Intelligence

Fall. 2 credits. Pre- or corequisite: CS 4700.

CS 4740 Introduction to Natural Language Processing (also COGST 4740, LING 4474)

Spring. 4 credits. Prerequisite: CS 2110.

CS 4780 Machine Learning

Spring. 4 credits. Prerequisites: CS 2111, CS 2800, or basic probability theory, and basic knowledge of linear algebra.

[CS 4782 Probabilistic Graphical Models (also BTRY 4790)]

Fall. 4 credits. Prerequisites: probability theory (BTRY 4080 or equivalent), programming and data structures (CS 2110 or equivalent); course in statistical methods recommended but not required (BTRY 4090 or equivalent). Next offered 2010–2011.

For description, see BTRY 4790.]

CS 4812 Quantum Computation (also PHYS 4481/7681)

Spring. 2 credits. Prerequisite: familiarity with theory of vector spaces over complex numbers.

For description, see PHYS 4481.

CS 4820 Introduction to Analysis of Algorithms

Spring, summer. 4 credits. Prerequisites: CS 2800 and 3110.

[CS 4830 Introduction to Cryptography]

Fall. 4 credits. Prerequisites: CS 2800 (or equivalent), or permission of instructor. Next offered 2010–2011.]

CS 4850 Mathematical Foundations for the Information Age

Spring. 4 credits. Prerequisite: Mathematical maturity.

CS 4860 Applied Logic (also MATH 4860)

Fall. 4 credits. Prerequisites: MATH 2220 or 2940, CS 2800 or equivalent (e.g., MATH 3320, 4320, 4340, 4810), and some additional course in mathematics or theoretical computer science.

CS 4999 Independent Reading and Research

Fall, spring. 1–4 credits.

CS 5150 Software Engineering

Fall. 4 credits. Prerequisite: CS 2110 or equivalent experience programming in Java or C++.

CS 5220 Applications of Parallel Computers

Spring. 4 credits. Prerequisites: A course in numerical methods at the level of CS 3220 or higher.

CS 5300 The Architecture of Large-Scale Information Systems (also INFO 5300)

Spring. 4 credits. Prerequisite: CS/INFO 3300 or 4320.

For description, see INFO 5300 in CIS section.

CS 5410 Intermediate Computer Systems

Fall or spring. 4 credits. Prerequisite: CS 4410 or permission of instructor. Next offered fall 2009.

CS 5420 Parallel Computer Architecture (also ECE 5720)

Fall. 4 credits. Prerequisite: ECE 4750.

For description, see ECE 5720.

CS 5430 System Security

Fall or spring. 4 credits. Prerequisites: CS 4410 or 4450 and familiarity with Java, C, or C# programming languages. Next offered spring 2010.

CS 5620 Interactive Computer Graphics

Fall. 4 credits. Prerequisite: CS 4620.

CS 5643 Physically Based Animation for Computer Graphics

Spring. 4 credits. Prerequisites: CS/ENGRD 3220 and/or CS 4620 or permission of instructor.

CS 5722 Heuristic Methods for Optimization (also CEE 5090, ORIE 5340)

Fall. 3 or 4 credits. Prerequisites: CS/ENGRD 2110 or 3220 or CEE/ENGRD 3200, or graduate standing, or permission of instructor.

For description, see CEE 5290.

[CS 5846 Decision Theory I (also ECON 4760/6760)]**CS 6110 Advanced Programming Languages**

Spring. 4 credits. Prerequisite: graduate standing or permission of instructor.

CS 6210 Matrix Computations

Fall. 4 credits. Prerequisites: MATH 4110 and 4310 or permission of instructor. Offered alternate years.

[CS 6240 Numerical Solution of Differential Equations

Spring. 4 credits. Prerequisites: exposure to numerical analysis (e.g., CS 4210 or 6210), differential equations, and knowledge of MATLAB.]

CS 6320 Database Systems

Spring. 4 credits. Prerequisite: CS 4320 or permission of instructor.

CS 6322 Advanced Database Systems

Fall. 4 credits.

CS 6410 Advanced Systems

Fall or spring. 4 credits. Prerequisite: CS 4410 or permission of instructor. Offered fall 2009.

CS 6460 Peer-to-Peer Systems

Spring. 4 credits. Recommended: CS 6410.

CS 6464 Advanced Distributed Storage Systems

Spring. 4 credits. Prerequisites: CS 4410 or permission of instructor.

[CS 6620 Advanced Interactive Graphics

Fall or spring. 4 credits. Prerequisite: CS 4620 and 4621 or 5620 or permission of instructor. Next offered 2010-2011.]

CS 6630 Realistic Image Synthesis

Fall or spring. 4 credits. Prerequisites: CS 4620 or equivalent and undergraduate-level understanding of algorithms, programming, and vector calculus. Offered fall 2009.

[CS 6650 Computational Motion

Fall or spring. 4 credits. Prerequisites: Undergraduate-level understanding of algorithms, and some scientific computing. Next offered 2010-2011.]

CS 6670 Computer Vision

Fall or spring. 4 credits. Prerequisites: undergraduate-level understanding of algorithms and MATH 2210 or equivalent. Offered fall 2009.

CS 6700 Advanced Artificial Intelligence

Spring. 4 credits. Prerequisite: CS 4700 or permission of instructor.

CS 6740 Advanced Language Technologies (also INFO 6300)

Fall, spring. 3 credits. Prerequisite: permission of instructor. Neither CS 4300 nor CS 4740 are prerequisites.

[CS 6766 Reasoning about Uncertainty

Fall. 4 credits. Prerequisites: mathematical maturity and acquaintance with propositional logic. Next offered 2010-2011.]

CS 6780 Advanced Topics in Machine Learning

Fall or spring. 4 credits. Prerequisites: CS 4780 or equivalent, or CS 5780 or equivalent, or permission of instructor. Offered fall 2009.

[CS 6782 Probabilistic Graphical Models (also BTRY 6790)

Fall. 4 credits. Prerequisites: probability theory (BTRY 4080 or equivalent), programming and data structures (CS 2110 or equivalent); a course in statistical methods is recommended but not required (BTRY 4090 or equivalent). Next offered 2010-2011.

For description, see BTRY 6790.]

[CS 6810 Theory of Computing

Fall or spring. 4 credits. Prerequisite: CS 3810 and CS 4820 or 6820 or permission of instructor. Next offered 2010-2011.]

CS 6820 Analysis of Algorithms

Fall. 4 credits. Prerequisite: CS 4820 or graduate standing.

[CS 6822 Advanced Topics in Theory of Computing

Fall or spring. 4 credits. Prerequisite: CS 6820 or permission of instructor. Next offered 2010-2011.]

CS 6830 Cryptography

Fall. 4 credits. Prerequisites: general ease with algorithms and elementary probability theory, maturity with mathematical proofs (ability to read and write mathematical proofs).

CS 6840 Algorithmic Game Theory

Fall or spring. 4 credits. Prerequisite: background in algorithms and graphs at level of CS 4820. No prior knowledge of game theory or economics assumed. Offered fall 2009.

[CS 6850 The Structure of Information Networks (also INFO 6850)]**CS 6860 Logics of Programs**

Spring. 4 credits. Prerequisites: CS 4810, 6810, and (CS/MATH 4860 or MATH 4810).

CS 7090 Computer Science Colloquium

Fall, spring. 1 credit. For staff, visitors, and graduate students interested in computer science. S-U grades only.

CS 7190 Seminar in Programming Languages

Fall, spring. 1 credit. Prerequisite: CS 6110 or permission of instructor. S-U grades only.

CS 7192 Seminar in Programming Refinement Logics

Fall, spring. 4 credits. Prerequisite: permission of instructor.

CS 7320 Topics in Database Systems

Fall, spring. 4 credits. S-U grades only.

CS 7390 Database Seminar

Spring. 1 credit. S-U grades only. Prerequisite: CS 6322 or permission of instructor.

CS 7490 Systems Research Seminar

Fall, spring. 1 credit. S-U grades only.

CS 7690 Computer Graphics Seminar

Fall, spring. 3 credits.

[CS 7726 Evolutionary Computation and Design Automation (also MAE 6500)

Spring. 4 credits. Prerequisite: programming experience or permission of instructor. Next offered 2010-2011.]

CS 7790 Seminar in Artificial Intelligence

Fall, spring. 4 credits. Prerequisite: permission of instructor. S-U grades only.

CS 7794 Seminar in Natural Language Understanding

Fall, spring. 2 credits.

CS 7860 Introduction to Kleene Algebra

Spring. 4 credits. Prerequisites: CS 4810 and (CS 4680 or MATH 4810).

CS 7890 Seminar in Theory of Algorithms and Computing

Fall, spring. 4 credits. Prerequisite: permission of instructor. S-U grades only.

CS 7893 Cryptography Seminar

Fall, spring. 1 credit.

CS 7999 Independent Research

Fall, spring. Prerequisite: permission of computer science advisor. Independent research or master of engineering project.

CS 9999 Thesis Research

Fall, spring. Prerequisite: permission of computer science advisor. S-U grades only. Doctoral research.

EARTH AND ATMOSPHERIC SCIENCES

L. D. Brown, chair; A. T. DeGaetano, associate chair (CALS); J. L. Cisne, director of undergraduate studies (Science of Earth Systems); R. W. Allmendinger, W. D. Allmon, C. Andronicos, L. M. Cathles, S. J. Colucci, A. T. DeGaetano, L. A. Derry, M. Goman, C. H. Greene, D. L. Hysell, T. E. Jordan, R. W. Kay, S. Mahlburg Kay, R. Lohman, N. Mahowald, B. Monger, A. Moore, J. Phipps Morgan, M. Pritchard, S. J. Riha, W. M. White, D. S. Wilks, M. W. Wysocki

For complete course descriptions, see the Earth and Atmospheric Sciences listing in the College of Arts and Sciences or College of Agriculture and Life Sciences section.

EAS 1101 Introductory Geological Sciences (To Know Earth)

Fall. 3 credits. C. Andronicos and R. Allmendinger.

EAS 1108 Earth in the News

Summer. 3 credits. S. L. Losh.

EAS 1109 Dinosaurs

Fall. 1 credit. J. L. Cisne.

EAS 1150 Severe Weather Phenomena

Summer. 3 credits. M. W. Wysocki.

EAS 1190 Fossil Preparation

Fall. 1 credit. Prerequisite: EAS 1109 or related EAS course. W. Allmon and J. Cisne.

EAS 1220 Earthquake! (also ENGR 1220)

Spring. 3 credits. L. Brown. Course in Introduction to Engineering series. For description, see ENGR 1220.

EAS 1310 Basic Principles of Meteorology

Fall. 3 credits. 1-credit lab is EAS 1330. M. W. Wysocki.

EAS 1330 Basic Meteorology Lab

Fall. 1 credit. Corequisite: EAS 1310. M. W. Wysocki.

Covers topics presented in EAS 1310.

EAS 1340 Weather Analysis and Forecasting

Spring. 1 credit. Prerequisites: EAS 1310 and EAS 1330. S–U grades only. M. W. Wysocki and staff.

This course will serve as an extension of the EAS 1330 first-year majors lab. It will provide opportunity for formal weather briefings, explore specific atmospheric storms (synoptic and mesoscale, including the climatology of each storm type), through assigned readings, map analysis, and weather discussions.

EAS 1400 Freshman Writing Seminar "Writing in the Sciences: Environmental Perspectives"

Spring. 3 credits. S. Jessup.

EAS 1540 Introductory Oceanography (also BIOEE 1540)

Fall, summer. 3 credits. Lec. Optional 1-credit lab is EAS/BIOEE 1550. Fall: C. Greene and B. Monger; summer: B. Monger.

EAS 1550 Introductory Oceanography Lab (also BIOEE 1550)

Fall. 1 credit. Lab. Corequisite: EAS/BIOEE 1540. C. Greene and B. Monger.

Laboratory course covering topics presented in EAS/BIOEE 1540.

EAS 1551 Introduction to Oceanography Lab (also BIOSM 1551)

Summer. 1 credit. Prerequisites: college-level science course, or EAS 1540, or marine science course or permission of instructor. B. Monger and C. Greene

EAS 1700 Evolution of the Earth and Life

Spring. 3 credits. J. L. Cisne.

EAS 2130 Marine and Coastal Geology

Summer. 4 credits. Prerequisite: introductory geology or ecology or permission of instructor. Staff.

EAS 2200 The Earth System

Fall, spring. 4 credits. Prerequisites: MATH 1110/1910. Letter grades only. W. M. White.

[EAS 2220 Seminar—Hawaii's Environment

Fall. 1 credit. S–U grades only. Next offered 2010–2011. A. Moore.]

EAS 2500 Meteorological Observations and Instruments

Fall. 4 credits. Prerequisite: EAS 1310. M. W. Wysocki.

EAS 2680 Climate and Global Warming

Spring. 3 credits. Prerequisite: basic college math. S–U or letter grades. A. T. DeGaetano.

EAS 2900 Computer Programming and Meteorology Software

Spring. 3 credits. Prerequisites: EAS 1310; MATH 1110 or equivalent. N. Mahowald and B. Belcher.

EAS 2960 Forecast Competition

Fall and spring. 1 credit; students enroll for two consecutive semesters; credit awarded for second semester; may be repeated for credit. Prerequisite: undergraduate standing in atmospheric science or permission of instructor. S–U grades only. D. S. Wilks.

EAS 3010 Evolution of the Earth System

Fall. 4 credits. Prerequisites: EAS 2200, MATH 1110 or 1910, and one chemistry course (college or high school). T. Jordan, S. Riha, and W. D. Allmon. Two Saturday field trips.

EAS 3030 Introduction to Biogeochemistry (also NTRES 3030)

Fall. 4 credits. Prerequisites: CHEM 2070 or equivalent, MATH 1120, plus a biology and/or geology course. J. Yavitt.

EAS 3040 Interior of the Earth

Spring. 3 credits. Prerequisite: EAS 2200 or permission of instructor. C. Andronicos.

EAS 3050 Climate Dynamics

Fall. 3 credits. Prerequisite: two semesters of calculus and one semester of physics. N. Mahowald.

EAS 3060 Evolution of Ancient and Modern Oceans (also BIOSM 3060)

Summer. 6 credits. Prerequisites: introductory biology (two semesters) and college-level course in Earth science, or permission of instructor. W. Allmon.

EAS 3220 Biogeochemistry of the Hawaiian Islands

Spring. 4 credits. Prerequisite: enrollment in EES semester in Hawaii, EAS 2200, EAS 3030, or permission of instructor. L. A. Derry.

EAS 3340 Microclimatology

Spring. 3 credits. Prerequisite: physics course. D. S. Wilks.

EAS 3400 Field Study of the Earth System

Spring. 6 credits. Prerequisites: enrollment in Earth and Environmental Sciences Semester in Hawaii; one semester of calculus (MATH 1910/1920 or 1110/1120 and two semesters of any of the following: PHYS 2207/2208 or 1112/2213; CHEM 2070/2080 or 2090/2080; BIOG 1101/1103–1102/1104 or 1105/1106 or 1109/1100; or equivalent course work. A. Moore.

EAS 3410 Atmospheric Thermodynamics and Hydrostatics

Fall. 3 credits. Prerequisites: one year of calculus and one semester of physics. M. W. Wysocki.

EAS 3420 Atmospheric Dynamics (also ASTRO 3342)

Spring. 3 credits. Prerequisites: MATH 2930, 2130 or equivalent; one semester of physics. Staff.

EAS 3500 Dynamics of Marine Ecosystems (also BIOEE 3500)

Fall. 3 credits. Prerequisites: one year of calculus and a semester of oceanography (e.g., EAS 1540), or permission of instructor. Offered alternate years. C. H. Greene and R. W. Howarth.

EAS 3510 Conservation Oceanography (BIOEE 3510)

Spring. 4 credits. Recommended: EAS 3400. C. H. Greene and C. D. Harvell.

EAS 3520 Synoptic Meteorology I

Spring. 3 credits. Prerequisite: EAS 3410. Corequisite: EAS 3420. M. W. Wysocki.

[EAS 3530 Physical Oceanography

Fall. 3 credits. Prerequisites: MATH 1120 or 1920, or one year of physics, or permission of instructor. Offered alternate years; next offered 2010–2011. B. C. Monger.]

EAS 4010 Fundamentals of Energy and Mineral Resources

Fall. 3 credits. Previous course in geology helpful but not necessary. L. Cathles.

[EAS 4040 Geodynamics

Spring. 3 credits. Prerequisite: calculus and calculus-based physics course or permission of instructor. Offered alternate years; next offered 2010–2011. J. Phipps Morgan.]

EAS 4050 Active Tectonics

Spring. 3 credits. Recommended: mechanical background equivalent to EAS 4260/4880. S–U or letter grades. Offered alternate years. R. Lohman.

[EAS 4060 Marine Geology and Geophysics

Spring. 4 credits. Prerequisites: EAS 2200 or comparable course; completion of some EAS classes helpful, but not required. Next offered 2010–2011. J. Phipps-Morgan.]

EAS 4170 Field Mapping in Argentina

Summer. 4 credits. Prerequisites: introductory EAS course and EAS 4260 or EAS 3040. Offered alternate years. S. Mahlborg Kay.

[EAS 4250 European Discovery of Impacts and Explosive Volcanism

Spring. 2 credits. Prerequisite: junior, senior, or graduate students with background in geology and permission of instructor. One two-hour meeting per week plus field trip during spring break. Offered alternate years; next offered 2010–2011. J. Phipps Morgan.]

EAS 4260 Structural Geology

Spring. 4 credits. Prerequisite: one semester of calculus plus an introductory geology course or permission of instructor. One weekend field trip. C. Andronicos.

[EAS 4340 Exploration Geophysics

Fall. 3 credits. Prerequisites: MATH 1920 and PHYS 2208, 2213, or equivalent. Offered alternate years; next offered 2010–2011. L. D. Brown.]

EAS 4350 Statistical Methods in Meteorology and Climatology

Fall. 3 credits. Prerequisites: one introductory course each in statistics (e.g., AEM 2100) and calculus. D. S. Wilks.

EAS 4370 Geophysical Field Methods (also ARKEO 4370)

Fall. 3 credits. Prerequisite: PHYS 2208 or 2213 or permission of instructor. Offered alternate years. L. D. Brown.

[EAS 4400 Seminar: Climate Science, Impacts and Mitigation

Fall. 2 credits. Prerequisites: junior or higher standing. Offered alternate years; next offered 2010–2011. N. Mahowald.]

EAS 4470 Physical Meteorology

Fall. 3 credits. Prerequisites: one year each of calculus and physics. Offered alternate years. A. T. DeGaetano.

EAS 4510 Synoptic Meteorology II

Fall. 3 credits. Prerequisites: EAS 3410 and 3420. S. J. Colucci.

EAS 4530 Mineralogy

Fall. 4 credits. Prerequisites: CHEM 2070 or 2090 or permission of instructor. S. Mahlburg Kay.

[EAS 4540 Petrology and Geochemistry

Spring. 4 credits. Prerequisite: EAS 4530. Next offered 2010-2011. R. W. Kay.]

EAS 4550 Geochemistry

Fall. 4 credits. Prerequisites: CHEM 2070 or CHEM 2090 and MATH 1920 or equivalent. Recommended: EAS 3040. Offered alternate years. W. M. White.

EAS 4560 Mesoscale Meteorology

Spring. 3 credits. Prerequisites: EAS 3410 and 3420 or permission of instructor. S. J. Colucci.

[EAS 4570 Atmospheric Air Pollution

Fall. 3 credits. Prerequisites: EAS 3410 or one course in thermodynamics, and one semester of chemistry, or permission of instructor. Offered alternate years; next offered 2010-2011. M. W. Wysocki.]

[EAS 4580 Volcanology

Fall. 3 credits. Prerequisite: EAS 3040 or equivalent. Offered alternate years; next offered 2010-2011. R. W. Kay.]

[EAS 4600 Late Quaternary Paleocology

Fall. 4 credits. Offered alternate years; next offered 2010-2011. M. Goman.]

EAS 4610 Paleoclimate: Since the Last Ice Age

Fall. 3 credits. Prerequisite: EAS 2200 or permission of instructor. Offered alternate years. M. Goman.

[EAS 4620 Marine Ecology (also BIOEE 4620)

Fall. 3 credits. Limited to 75 students. Prerequisite: BIOEE 2610. Offered alternate years; next offered 2010-2011. C. D. Harvell and C. H. Greene. For description, see BIOEE 4620.]

EAS 4700 Weather Forecasting and Analysis

Spring. 3 credits. Prerequisites: EAS 3520 and 4510. M. W. Wysocki.

[EAS 4710 Introduction to Groundwater Hydrology (also BEE 4710)

Spring. 3 credits. Prerequisites: MATH 2940 and ENGRD 2020. Offered alternate years; next offered 2010-2011. L. M. Cathles and T. S. Steenhuis.]

EAS 4750 Special Topics in Oceanography

Fall, spring, summer. 2-6 credits, variable. Prerequisites: one semester of oceanography and permission of instructor. Fall, spring: C. H. Greene; summer: B. C. Monger.

EAS 4760 Sedimentary Basins

Spring. 3 credits. Prerequisite: EAS 3010 or permission of instructor. Offered alternate years. T. E. Jordan.

[EAS 4780 Advanced Stratigraphy

Fall. 3 credits. Prerequisite: EAS 3010 or permission of instructor. Offered alternate years; next offered 2010-2011. T. E. Jordan.]

EAS 4790 Paleobiology (also BIOEE 4790)

Spring. 4 credits. Prerequisites: one year introductory biology and either BIOEE 2740 or 3730 or EAS 3010, or permission of instructor. W. D. Allmon.

EAS 4800 Our Changing Atmosphere: Global Change and Atmospheric Chemistry (also BEE 4800)

Fall. 3 credits. Prerequisites: CHEM 2090, MATH 1920, PHYS 1112, or equivalent, or permission of instructor. S-U or letter grade. P. G. Hess.

EAS 4820 Atmospheric Modeling

Spring. 3 credits. Prerequisite: differential equations, introductory computer background, junior standing or above or permission of instructor. S-U or letter grades. N. Mahowald.

[EAS 4830 Land, Water, Agriculture, and Environment (also CSS 4830)

Fall. 4 credits. Prerequisite: CSS 2600 or equivalent calculus. Next offered 2010-2011. H. Van Es and S. J. Riha.]

[EAS 4840 Inverse Methods in the Natural Sciences

Fall. 3 credits. Prerequisite: MATH 2940. Next offered 2010-2011. D. L. Hysell.]

EAS 4870 Introduction to Radar and Remote Sensing (also ECE 4870)

Spring. 3 credits. Prerequisites: PHYS 2208 or 2213 or equivalent, or permission of instructor. D. L. Hysell.

EAS 4880 Global Geophysics

Spring. 3 credits. Prerequisites: MATH 1920 (or 1120) and PHYS 2208 or 2213. Offered alternate years. M. Pritchard and R. Lohman.

EAS 4910-4920 Undergraduate Research

Fall, spring. 1-4 credits. Students must complete form at 2124 Snee Hall. Staff (J. L. Cisne, coordinator).

EAS 4940 Special Topics in Atmospheric Science (undergraduate level)

Fall or spring. 8 credits max. S-U or letter grades. Staff.

EAS 4960 Internship Experience

Fall, spring. 1-2 credits. Prerequisite: enrollment in EES semester in Hawaii and EAS 3400. S-U grades only. See department for more information. A. Moore.

EAS 4970 Individual Study in Atmospheric Science

Fall or spring. 1-6 credits. Students must register using independent study form. S-U grades only. Staff.

EAS 4980 Teaching Experience in Earth and Atmospheric Sciences

Fall or spring. 1-4 credits. Students must register using independent study form. S-U grades only. Staff.

EAS 4990 Undergraduate Research in Atmospheric Science

Fall, spring. Credit TBA. Students must register using independent study form. S-U grades only. Staff.

EAS 5000 Design Project in Geohydrology

Fall, spring. 3-12 credits. Alternative to industrial project for M.Eng. students choosing geohydrology option. May continue over two or more semesters. L. M. Cathles.

EAS 5020 Case Histories in Groundwater Analysis

Spring. 4 credits. L. M. Cathles.

EAS 5050 Fluid Dynamics in the Earth Sciences

Spring. 3 credits. Prerequisites: MATH through 2940, PHYS through 2208 or 2214, or permission of instructor. Offered alternate years. L. Cathles and M. Wysocki.

EAS 5110 Earth System Interactions

Fall. 1 credit (S-U) or 2 credits (with paper, letter grades). Prerequisite: permission of instructor. J. L. Cisne.

EAS 5220 Advanced Structural Geology I

Fall. 3 credits. Prerequisites: EAS 4260 and permission of instructor. Offered alternate years. R. W. Allmendinger and C. Andronicos.

EAS 5240 Advanced Structural Geology II

Fall. 3 credits. Prerequisites: EAS 4260 and permission of instructor. Offered alternate years. R. W. Allmendinger.

Geometry, kinematics, and mechanics of structural provinces.

EAS 5530 Advanced Petrology

Fall. 3 credits. Prerequisite: EAS 4540. Offered alternate years. R. W. Kay.

EAS 5540 Advanced Mineralogy

Spring. 3 credits. Prerequisites: EAS 4530 or permission of instructor. Offered alternate years. S. Mahlburg Kay.

[EAS 5750 Planetary Atmospheres (also ASTRO 6575)

Fall. 4 credits. Prerequisites: undergraduate physics, vector calculus. Offered alternate years; next offered 2010-2011. P. Gierasch.]

EAS 5770 Planetary Surface Processes (also ASTRO 6577)

Spring. 3 or 4 credits. Offered alternate years. J. Bell.

[EAS 5780 Planet Formation and Evolution (also ASTRO 6578)

Fall. 4 credits. Prerequisites: familiarity with elementary physics and math or permission of instructor. Offered alternate years; next offered 2010-2011. J.-L. Margot and M. Pritchard.

For description, see ASTRO 6578.]

[EAS 5840 Inverse Methods in the Natural Sciences

Fall. 3 credits. Prerequisite: MATH 2940. Next offered 2010-2011. D. L. Hysell.]

EAS 5880 Advanced Methods in Radar (also ECE 5890)

Fall. 3 credits. Prerequisite: EAS 4870 or permission of instructor. D. Hysell.

EAS 6280 Geology of Orogenic Belts

Spring. 3 credits. Prerequisite: permission of instructor. S. M. Kay.

[EAS 6410 Analysis of Biogeochemical Systems

Spring. 2 credits. Prerequisite: MATH 2930 or permission of instructor. Offered alternate years; next offered 2010-2011. L. A. Derry.]

EAS 6480 Air Quality and Atmospheric Chemistry (also MAE 6480)

Fall. 3 credits. Prerequisites: freshman chemistry and thermodynamics (or equivalent) and fluid mechanics (or equivalent); graduate standing or permission of instructor. S–U or letter grades. K. M. Zhang.

For description, see MAE 6480.

EAS 6520 Advanced Atmospheric Dynamics (also ASTRO 7652)

Spring. 3 credits. Prerequisites: EAS 3410 and 3420 or equivalent. S. J. Colucci.

[EAS 6560 Isotope Geochemistry]

Spring. 3 credits. Open to undergraduates. Prerequisite: EAS 4550 or permission of instructor. Offered alternate years; next offered 2010–2011. W. M. White.]

[EAS 6660 Applied Multivariate Statistics]

Spring. 3 credits. Prerequisites: multivariate calculus, matrix algebra, and two statistics courses. Offered alternate years; next offered 2010–2011. D. S. Wilks.]

EAS 6750 Modeling the Soil-Plant-Atmosphere System (also CSS 6750)

Spring. 3 credits. Prerequisite: EAS/CSS 4830 or equivalent. S. J. Riha.

EAS 6920 Special Topics in Atmospheric Science

Fall, spring. 1–6 credits. S–U or letter grades. Staff.

EAS 6930 Special Topics in Geological Sciences

Fall or spring. 1–3 credits, variable. S–U or letter grades. Staff.

EAS 7000–7990 Seminars and Special Work

Fall, spring. 1–3 credits. Prerequisite: permission of instructor. Staff.

EAS 7010–7020 Thesis Research

7010, fall; 7020, spring. 1–15 credits, variable. S–U or letter grades. Staff.

EAS 7110 Upper Atmospheric and Space Physics

Fall or spring. 1–6 credits. D. L. Hysell. Seminar.

EAS 7220 Advanced Topics in Structural Geology

R. W. Allmendinger.

EAS 7310 Advanced Topics in Remote Sensing and Geophysics (also ASTRO 7671)

M. Pritchard and J. Bell.

EAS 7330 Advanced Topics in Geodynamics

Spring. J. Phipps Morgan.

EAS 7500 Satellite Remote Sensing in Biological Oceanography

Summer. 3 credits. B. C. Monger.

EAS 7510 Petrology and Geochemistry

R. W. Kay.

EAS 7550 Advanced Topics in Tectonics and Geochemistry

Fall. 3 credits. J. Phipps Morgan.

EAS 7570 Current Research in Petrology and Geochemistry

S. Mahlburg Kay.

EAS 7620 Advanced Topics in Paleobiology

W. D. Allmon.

EAS 7650 Topics in Paleocology

Fall. 1 credit. S–U grade only. G. Dietl.

EAS 7710 Advanced Topics in Sedimentology and Stratigraphy

T. E. Jordan.

EAS 7730 Paleobiology

J. L. Cisne.

EAS 7750 Advanced Topics in Oceanography

C. H. Greene.

EAS 7800 Earthquake Record Reading

Fall. R. Lohman and M. Barazangi.

EAS 7810 Advanced Topics in Exploration Geophysics

L. D. Brown.

EAS 7930 Andes-Himalaya Seminar

S. Mahlburg Kay, R. W. Allmendinger, M. Pritchard, and T. E. Jordan.

EAS 7950 Low-Temperature Geochemistry

1–3 credits. S–U grades only. L. A. Derry.

EAS 7960 Geochemistry of the Solid Earth

W. M. White.

EAS 7970 Fluid-Rock Interactions

L. M. Cathles.

EAS 7990 Soil, Water, and Geology Seminar

Spring. L. M. Cathles and T. S. Steenhuis.

EAS 8500 Master's-Level Thesis Research in Atmospheric Science

Fall, spring. Credit TBA. S–U grades only. Graduate faculty.

Thesis research for atmospheric science master's students.

EAS 9500 Graduate-Level Dissertation Research in Atmospheric Science

Fall, spring. Credit TBA. S–U or letter grades. Graduate faculty.

Dissertation research for atmospheric science Ph.D. students only before "A" exam has been passed.

EAS 9510 Doctoral-Level Dissertation Research in Atmospheric Science

Fall, spring. Credit TBA. S–U or letter grades. Graduate faculty.

Dissertation research for atmospheric science Ph.D. candidates after "A" exam has been passed.

ELECTRICAL AND COMPUTER ENGINEERING

T. Chen, director; T. L. Fine, assoc. director; D. F. Delchamps, advising coordinator; E. Afshari, D. H. Albonese, A. B. Apse, A. S. Avestimehr, S. Bhave, A. W. Bojanczyk, H.-D. Chiang, P. Doerschuck, L. F. Eastman, W. K. Fuchs, Z. J. Haas, D. A. Hammer, S. S. Hemami, C. R. Johnson, Jr., E. Kan, M. C. Kelley, P. M. Kintner, R. R. Kline, A. Lal, M. Lipson, R. Manohar, J. F. Martínez, A. Molnar, C. R. Pollock, F. Rana, A. P. Reeves, A. Scaglione, C. E. Seyler, J. R. Shealy, X. Shen, E. G. Sireer, M. G. Spencer, G. E. Suh, A. Tang, S. Tiwari, L. Tong, A. B. Wagner, S. B. Wicker

ECE 1260 Introduction to Signals and Telecommunications (also ENGR 1260)

Spring. 3 credits.

For description, see ENGR 1260.

ECE 2100 Introduction to Circuits for Electrical and Computer Engineers (also ENGRD 2100)

Fall, spring. 4 credits. Corequisites: MATH 2930 and PHYS 2213. All students must enroll in a lab and a sec.

For description, see ENGRD 2100.

ECE 2200 Signals and Systems

Spring. 4 credits. Prerequisites: MATH 2930 and CS 1112 or 1132. Corequisite: MATH 2940.

Introduction to signal processing. Topics include frequency-based representations: Fourier analysis and synthesis; discrete time linear systems: input/output relationships, filtering, spectral response; analog-to-digital and digital-to-analog conversion; continuous time signals and linear time invariant systems: frequency response and continuous-time Fourier transform.

ECE 2300 Introduction to Digital Logic Design (also ENGRD 2300)

Fall, spring. 4 credits. Prerequisite: CS 1110 or 1112.

For description, see ENGRD 2300.

ECE 2350 Career Development for Engineering (also ENGRG 2350)

Spring. 2 credits. Prerequisite: second-semester freshman or sophomore standing.

For description, see ENGRG 2350.

ECE 2500 Technology in Society (also ENGRG/HIST 2500, STS 2501)

Fall. 3 credits. Humanities elective for engineering students.

For description, see ENGRG 2500.

ECE 2910–2920 Sophomore Electrical and Computer Engineering Independent Project

2910, fall; 2920, spring. 1–8 credits.

Individual study or directed reading in connection with a special engineering problem chosen by the student, after consultation with the faculty member directing the project. An engineering report on the project is required. Students must make individual arrangements with a faculty sponsor and submit an Independent Project Form to the Student Services Office, 223 Phillips Hall.

ECE 2930–2939; 2940–2949 Sophomore Electrical and Computer Engineering Group Projects

2930–2939, fall; 2940–2949, spring. 1–8 credits.

Group study, analysis, and, usually, experimental tests in connection with a special engineering project chosen by the students after consultation with the faculty member directing the project. New projects will be added upon faculty request. Written progress reports are required. Students must submit a Group Project Form to the Student Services Office, 223 Phillips Hall.

ECE 2980 Inventing an Information Society (also AMST/ENGRG 2980, HIST 2920, INFO 2921, STS 2921)

Spring. 3 credits. Approved for humanities distribution.

For description, see ENGRG 2980.

ECE 3030 Electromagnetic Fields and Waves

Fall, summer. 4 credits. Prerequisites: grade of C or better in PHYS 2213, PHYS 2214, MATH 2930, MATH 2940, and ECE/ENGRD 2100.

Covers static, quasi-static, and dynamic electromagnetic fields and waves. Topics include Maxwell's equations (integral and differential forms), fields of charge and current distributions, boundary conditions, fields near conductors, method of images, material polarization and dielectrics; energy, work, and power in electromagnetic systems; wave propagation and polarization, waves in media (dielectrics, conductors, and anisotropic materials); reflection, transmission, and refraction at media interfaces; guided waves in transmission lines, Smith charts, transients; metallic and dielectric waveguides; radiation and antennas, antenna arrays, electric circuits for transmission and reception, aperture antennas and diffraction.

ECE 3100 Introduction to Probability and Inference for Random Signals and Systems (also ENGRD 3100)

Fall, summer. 4 credits. Prerequisites: MATH 2940, PHYS 2213, or equivalents.

Introduction to probabilistic techniques for modeling random phenomena and making estimates, inferences, predictions, and engineering decisions in the presence of chance and uncertainty. Probability measures, classical probability and combinatorics, countable and uncountable sample spaces, random variables, probability mass functions, probability density functions, cumulative distribution functions, important discrete and continuous distributions, functions of random variables including moments, independence and correlation, conditional probability, Total Probability and Bayes' rule with application to random system response to random signals, characteristic functions and sums of random variables, the multivariate Normal distribution, maximum likelihood and maximum a posteriori estimation, Neyman-Pearson and Bayesian statistical hypothesis testing, Monte Carlo simulation. Applications in communications, networking, circuit design, device modeling, and computer engineering.

ECE 3130 Computerized Instrumentation Interface Design

Summer. 3 credits. Prerequisites: ECE 2100, and/or ECE/ENGRD 2300, and/or programming at level of CS 2110. Can be used for ECE students as an Outside ECE Technical Elective or College Approved Elective (with advisor approval).

This course will explore the technologies for performing both speech recognition and computer-activated control through custom interface circuitry. Use will be made of commercial as well as custom software and hardware. Students will be expected to implement several methods in the programming languages C or JAVA. This is a team-oriented product development experience. Students will define the requirements of a product (a speech-controlled CD player) and organize into a development team according to their specialty knowledge skill sets. Application-oriented computer programming, digital interface circuit design, analog amplifiers and filters are important to the project. This course spans the two co-op sessions. The system-level planning and basic component and module testing is completed in the first term, and the final

construction and system integration will occur in the second half. Students are required to complete both sessions for a grade.

ECE 3140 Computer Organization (also CS 3420)

Spring. 4 credits. Prerequisite: CS/ENGRD 2110 or ENGRD 2300.

Topics include performance metrics, data formats, instruction sets, addressing modes, computer arithmetic, microcoded and pipelined datapath design, memory hierarchies including caches and virtual memory, I/O devices, bus-based I/O systems. Students learn assembly language programming and design a simple pipelined processor.

ECE 3150 Introduction to Microelectronics

Spring. 4 credits. Prerequisite: ECE/ENGRD 2100.

The course offers an introduction to the basic devices and circuits in modern microelectronics. Students will learn not only basic structures and operations of semiconductor devices through simple models (diodes, CMOS, and BJT) but also how to analyze and design basic transistor modules in digital and analog circuits including biasing, amplifiers, filters, logic gates, and memory. We will introduce intuitive design methods to map circuit specifications to transistor topology, as well as first-order time-constant estimation. SPICE and measurement labs will accompany the progress in lectures for hands-on experiences.

ECE 3200 Networks and Systems

Spring. 4 credits. Prerequisites: ECE 2200 and MATH 2940.

Students develop a working understanding of the analytical and computational tools used in the design and representation of complex networks and systems. Topics include state-space techniques, finite state machines, graph-theoretic approaches to network design and analysis, complexity, phase transitions in complex systems, and scalability.

ECE 3250 Mathematics of Signal and System Analysis

Fall. 3 credits. Prerequisites: MATH 2930, MATH 2940, and ECE 2200 or permission of instructor.

Course aims to deepen students' working knowledge of mathematical tools relevant to ECE applications. While the course emphasizes fundamentals, it also provides an ECE context for the topics it covers, which include foundational material about sets and functions; linear algebra; inner products and orthogonal representations; basic ideas from multivariable calculus; and elementary convex analysis.

ECE 3600 Ethical Issues in Engineering Practice (also ENGRG 3600, STS 3601)

Spring. 3 credits. Open to sophomores. For description, see ENGRG 3600.

ECE 3910-3920 Junior Electrical and Computer Engineering Independent Project

3910, fall; 3920, spring. 1-8 credits.

For description, see ECE 2910-2920.

ECE 3930-3939; 3940-3949 Junior Electrical and Computer Engineering Group Project

3930-3939, fall; 3940-3949, spring. 1-8 credits.

For description, see ECE 2930-2939; 2940-2949.

ECE 4060 Introduction to Quantum and Statistical Physics

Fall. 4 credits. Prerequisites: PHYS 2214, MATH 2940, and ECE 3150 or co-registration.

Introductory quantum, statistical, and solid-state physics concepts necessary for understanding modern solid-state electronic and optical devices. Topics include the formalism and methods of quantum mechanics, structures of atoms, molecules, and solids and their interactions with electromagnetic waves, statistical physics, and the basic physics of semiconductor.

ECE 4070 Physics of Semiconductors and Nanostructures

Spring. 4 credits. Prerequisites: ECE 3060 or AEP 3610 and AEP 4230.

This course covers basic solid state and semiconductor physics relevant for understanding electronic and optical devices. Topics include crystalline structures, bonding in atoms and solids, energy bands in solids, electron statistics and dynamics in energy bands, effective mass equation, carrier transport in solids, Boltzmann transport equation, semiconductor homo- and hetero-junctions, optical processes in semiconductors, electronic and optical properties of semiconductor nanostructures, semiconductor quantum wells, wires, and dots, electron transport in reduced dimensions, semiconductor lasers and optoelectronics, high-frequency response of electrons in solids and plasmons.

ECE 4110 Random Signals in Communications and Signal Processing

Fall. 4 credits. Prerequisite: ECE 2200 and ECE 3100 or equivalent.

Introduction to models for random signals in discrete and continuous time; Markov chains, Poisson process, queuing processes, power spectral densities, Gaussian random process. Response of linear systems to random signals. Elements of estimation and inference as they arise in communications and digital signal processing systems.

ECE 4130 Introduction to Nuclear Science and Engineering (also MAE 4580, TAM 4130)

Fall. 3 credits. Prerequisites: PHYS 2214 and MATH 2940.

For description, see TAM 4130.

ECE 4150 GPS: Theory and Design (also MAE 4150)

Fall. 4 credits. Culminating design experience (CDE) course. Prerequisite: 3000-level engineering course with advanced math content (e.g., ECE 3030 or MAE 3260).

Analysis of GPS operating principles and engineering practice with a culminating design exercise. Navigational algorithms, receiver analysis, error investigation, dilution of precision, antennas, differential GPS.

ECE 4210 Signal Processing Algorithms in Support of Painting Analysis

Fall. 3 credits. Prerequisites: ECE 2200 and MATH 2940. Recommended: ECE 3250.

The analysis of fine art paintings by art historians and conservation specialists involves the close examination of various images (e.g., visible light, x-ray) of the painting. This course will focus on the paintings of Vincent Van Gogh and highlight case studies of recent technical examinations. The signal processing tasks encountered will be extracted and rudimentary solutions proposed based on

fundamental signal processing techniques. Students will assess and improve these "starter" schemes, performing (a) periodicity extraction (e.g., for canvas thread counting), (b) set membership discrimination (e.g., for artist identification), and (c) multiple image alignment (e.g., for x-ray stitching). In this emerging application for signal processing, several of these tasks have no widely adopted computer-assisted schemes. MATLAB will be used for implementation of the algorithms on high resolution image data provided by the Van Gogh Museum (Amsterdam, the Netherlands).

ECE 4250 Digital Signal Processing

Fall. 4 credits. Prerequisites: ECE 2200 and 3100.

Introduces statistical signal processing. Signal representation and manipulation are covered via correlation and using the DFT/FFT to estimate other transforms; applications of these topics are then covered, including quantization, quantization effects in digital filters, multirate DSP, filter banks, delta-sigma modulation, power spectrum estimation, and introductions to Wiener and Kalman filtering and image processing.

ECE 4260 Applications of Signal Processing

Spring. 4 credits. Culminating Design Experience (CDE) course. Prerequisite: ECE 4250 or permission of instructor.

Applications of signal processing, including signal analysis, filtering, and signal synthesis. The course is laboratory oriented, emphasizing individual student projects. Design is done with signal-processing hardware and by computer simulation. Topics include filter design, spectral analysis, speech coding, speech processing, digital recording, adaptive noise cancellation, and digital signal synthesis.

ECE 4271 Evolutionary Processes. Evolutionary Algorithms, Evolutionary Games

Fall. 3 credits. Prerequisites: MATH 2930, MATH 2940, and ECE 3100 or instructor's permission. Offered alternate years.

The course covers a collection of topics relevant to the modeling, analysis, simulation, and optimization of large complex multi-agent systems. Topics include countable-state Markov chains, theoretical issues in evolutionary algorithms and their historical antecedents, and an introduction to evolutionary game theory. The course assumes no prior background in evolutionary algorithms or game theory.

ECE 4300 Lasers and Optoelectronics

Fall. 4 credits. Prerequisite: ECE 3030 or equivalent.

Introduction to the operation and application of lasers. Cover diffraction-limited optics, Gaussian beams, optical resonators, interaction of radiation with matter, physics of laser operation, and laser design. Discusses applications of coherent radiation to nonlinear optics, communication, and research.

ECE 4320 MicroElectro Mechanical Systems (MEMS) (also MAE 4320)

Fall. 4 credits. Prerequisite: ECE 3150 or permission of instructor.

Introduction to MEMS: microsensors, microactuators, and microrobots. Fundamentals of MEMS, including materials, microstructures, devices and simple microelectro-mechanical systems, scaling electronic and mechanical systems to the micrometer/nm-scale, material

issues, and the integration of micromechanical structures and actuators with simple electronics. This is an interdisciplinary course drawing content from mechanics, materials, structures, electronic systems, and the disciplines of physics and chemistry.

ECE 4330 Microwave Theory, Devices, and Applications

Fall. 4 credits. Prerequisite: ECE 3030.

Introduction to the properties of microwave devices and their applications in circuits, waveguides, resonators, and antennas. The course will cover the considerations that must be appreciated when the operating frequency approaches or exceeds 1GHz. Topics include microwave devices, microwave measurement techniques, S-parameters, signal flow diagrams, matching networks, basic circuit design considerations, and computer-aided device and circuit analysis. The course emphasizes physical understanding and intuitive design methods. Labs cover basic measurement techniques for active and passive elements as well as low noise amplifier design.

ECE 4370 Fiber and Integrated Optics

Spring. 4 credits. Culminating design experience (CDE) course. Prerequisite: ECE 3030 or equivalent.

Physical principles of optical waveguides. Wave equation solutions to the mode structure in waveguides, numerical analysis, mode coupling, dispersion and bandwidth limitations, optical materials, photonic band gap structures. Project design of planar optical components.

ECE 4450 Computer Networks and Telecommunications

Fall. 4 credits. Prerequisites: ECE 3140 or CS 3420 and course in probability.

Design, analysis, and implementation of computer and communication networks and systems. This is a basic course in networking. Examples of topics include data transmission and data encoding, data link control, circuit vs. packet switching, Asynchronous Transfer Mode, local area network technology, network interconnections, protocol design (OSE and IP), network security, and multimedia. Emphasis is placed on performance evaluation.

ECE 4510 Electric Power Systems I

Fall. 4 credits. Prerequisite: ECE 3200 or equivalent.

Acquaints students with modern electric power system analysis and control. Stresses analysis techniques appropriate for the restructured industry and advanced protection and control systems. Topics include transmission line models, transformers and per unit system, generator models, network matrices, power flow, system protection, computer relaying, and GPS-based measurement and control systems.

[ECE 4520 Electric Power Systems II

Spring. 4 credits. Prerequisite: ECE 3200 or permission of instructor. Next offered 2010–2011.

Acquaints students with modern electric power system operation and control. Explores aspects of the restructuring of the industry and its implications for planning and operation objectives and methods. Topics include unit commitment, economic dispatch, optimal power flow, control of generation, system security and reliability, state-estimation,

analysis of system dynamics, and system protection.]

ECE 4530 Analog Integrated Circuit Design

Fall. 4 credits. Culminating design experience (CDE) course. Prerequisite: ECE 3150 or equivalent.

Overview of devices available to analog integrated-circuit designers in modern CMOS and BiCMOS processes: resistors, capacitors, MOS transistors, and bipolar transistors. Basic building blocks for linear analog integrated circuits: single-stage amplifiers, current mirrors, and differential pairs. Transistor-level design of linear analog integrated circuits, such as operational amplifiers and operational transconductance amplifiers. Layout techniques for analog integrated circuits. Throughout the course, emphasis is placed on design-oriented analysis techniques.

ECE 4570 Silicon Device Fundamentals

Spring. 4 credits. Prerequisites: ECE 3150 and 3060 or MSE 2620 or AEP 4500.

The course teaches fundamental principles on semiconductor carrier statistics, band diagrams, pn-junction diodes, heterojunctions, Schottky diodes, BJT, MOS capacitor and MOSFET. Emphasis is put on the MOSFET designs for advanced VLSI technology from its physical structure, accurate modeling, manufacturability and applications. Device designs will include short channel effects, gate-stack alternatives, band engineering, and strain engineering. By using computer simulation and experimental data, the course will culminate in a design project dealing with technical concerns in current VLSI industry. The goal for this course is to train circuit, device, and process engineers for semiconductor technology research and development.

ECE 4720 Feedback Control Systems (also CHEM 4720, MAE 4780)

Fall. 4 credits. Prerequisites: CHEM 3720, ECE 2200, MAE 3260, or permission of instructor.

For description, see MAE 4780.

ECE 4740 Digital VLSI Design

Spring. 4 credits. Prerequisite: ECE 3150.

Introduction to digital VLSI design. Topics include basic transistor physics, switching networks and transistors, combinational and sequential logic, latches, clocking strategies, domino logic, PLAs, memories, physical design, floor planning, CMOS scaling, and performance and power considerations, etc. Lecture and homework topics emphasize disciplined design, and include CMOS logic, layout, and timing; computer-aided design and analysis tools; and electrical and performance considerations.

ECE 4750 Computer Architecture (also CS 4420)

Fall. 4 credits. Culminating design experience (CDE) course. Prerequisites: ENGRD 2300 and ECE 3140/CS 3420.

Topics include instruction set principles, advanced pipelining, data and control hazards, multi-cycle instructions, dynamic scheduling, out-of-order execution, speculation branch prediction, instruction-level parallelism, and high-performance memory hierarchies. Students learn the issues and trade-offs involved in the design of modern microprocessors. Labs involve the design of a processor and cache subsystem at the RTL level.

ECE 4760 Digital Systems Design Using Microcontrollers

Spring, 4 credits. Culminating design experience (CDE) course. Prerequisite: ECE 3140/CS 3420. ECE 3150 highly recommended.

Design of real-time digital systems using microprocessor-based embedded controllers. Students working in pairs design, debug, and construct several small systems that illustrate and employ the techniques of digital system design acquired in previous courses. The content focuses on the laboratory work. The lectures are used primarily for the introduction of examples, description of specific modules to be designed, and instruction in the hardware and high-level design tools to be employed.

ECE 4820 Plasma Processing of Electronic Materials (also MSE 4820)

Spring, 3 credits. Prerequisites: PHYS 2213 and 2214 or equivalents. Offered if sufficient demand.

Fundamental principles that govern partially ionized, chemically reactive plasma discharges and their applications to processing electronic materials. Topics include simple models of low pressure, partially ionized plasmas, collision phenomena, diffusive processes, plasma chemistry and surface processes. Examples and their applications to electronic materials processing are discussed in detail.

ECE 4840 Introduction to Controlled Fusion: Principles and Technology (also MAE 4590, AEP/NSE 4840)

Spring, 3 credits. Prerequisites: PHYS 1112, 2213, and 2214, or equivalent background in electricity and magnetism and mechanics. Intended for seniors and graduate students in engineering and physical sciences.

Introduction to the physical principles and various engineering aspects underlying power generation by controlled fusion. Topics include fuels and conditions required for fusion power and basic fusion-reactor concepts; fundamental aspects of plasma physics relevant to fusion plasmas and basic engineering problems for a fusion reactor; and an engineering analysis of proposed magnetic and/or inertial confinement fusion-reactor designs.

ECE 4870 Introduction to Radar Remote Sensing (also EAS 4870)

Spring, 3 credits. Prerequisites: ECE 2200 and 4860 (or grade of B or better in ECE 3030).

For description, see EAS 4870 in the College of Arts and Sciences.

ECE 4880 Radio Frequency (RF) Circuits and Systems

Spring, 4 credits. Prerequisite: ECE 3150 or equivalent.

Basic RF circuits and applications. Receivers, transmitters, modulators, filters, detectors, transmission lines, oscillators, frequency synthesizers, low-noise amplifiers. Applications include communication systems, radio and television broadcasting, radar, radio, and radar astronomy. Computer-aided circuit analysis. Six laboratory sessions.

ECE 4910-4920 Senior Electrical and Computer Independent Engineering Project

4910, fall; 4920, spring, 1-8 credits.

For description, see ECE 2910-2920.

ECE 4930-4939; 4940-4949 Senior Electrical and Computer Engineering Group Project

4930-4939, fall; 4940-4949, spring, 1-8 credits.

For description, see ECE 2930-2939; 2940-2949.

ECE 4950-4960 Special Topics in Electrical and Computer Engineering

4950, fall; 4960, spring, 1-4 credits.

Seminar, special interest, or temporary course.

ECE 5010 Professional Seminar for M.Eng. Students

Fall, 2 credits. Prerequisites: Must be an M.Eng. student.

This seminar introduces students to professional issues that are important as they begin their professional career. Topics include M.Eng. ECE project options; professional expectations; project planning and management; effective teamwork; technical writing and communications; impact of environmental, economic, and societal constraints in design; entrepreneurship possibilities; and career planning issues.

ECE 5020 Biomedical System Design (also BME 5020)

Spring, 4 credits. Co- or prerequisites: at least one of: ECE 4250, 4760, 4530.

Introduces techniques of measuring and conditioning low-level (biological) signals. Topics include special signal to noise improvement circuits for analog signals, techniques to remove common-mode and correlated noise, and computer-aided techniques for analyzing sampled data. Final six or seven weeks devoted to designing/prototyping a safe and effective "ambulatory microprocessor-controlled blood pressure monitor." Formal design document is required.

ECE 5030 Electronic Bioinstrumentation

Fall, 4 credits. Prerequisites: Intro Biol, analog design, signal processing, at the level of BIOL 1010, ECE 3150, and ECE 4250 respectively. For M.Eng. students only. Instructor permission required.

This course covers the theory and practical aspects of recording and analyzing electronic data collected from biological systems. Topics may include electrode and amplifier design, tissue impedance and effects on waveforms, sensors, statistical and signal processing algorithms, noise reduction, and safety considerations.

ECE 5040 Neural and Bioelectronic Interfaces

Spring, 3 credits. Prerequisites: one of ECE 4110, 4250, or 4260, and one of ECE 4530, 4570, 5020, or permission of instructor.

Intended for electrical and biomedical engineers interested in neural-electronic interfaces. The class spans several disciplines. An overview of the electrophysiology and biophysics of neurons and other electrogenic cells informs a subsequent discussion of the theoretical and practical aspects of electrical stimulation and recording, as well as discussion of emerging topics such as optical stimulation and recording. The course also covers some statistical signal processing techniques used in handling the large amounts of imprecise data the nervous system provides. Case studies in existing medical implants are reviewed, as examples of present-day challenges in the field.

ECE 5120 Applied Systems Engineering (also CEE 5240, CIS 5040, MAE 5910, ORIE 5120, SYSEN 5100)

Fall, 3 credits. Prerequisites: senior or graduate standing in engineering field; concurrent or recent (past two years) enrollment in group-based project with strong system design component approved by course instructor.

For description, see SYSEN 5100.

ECE 5130 System Architecture, Behavior, and Optimization (also CEE 5252, CIS 5050, MAE 5920, ORIE 5130, SYSEN 5200)

Spring, 3 credits. Prerequisite: CEE 5240/CIS 5040, ECE/ORIE 5120, MAE 5910, or SYSEN 5100.

For description, see SYSEN 5200.

ECE 5180 Principles of Medical Imaging (also BME/VTCS 6180)

Fall, 1-3 credits. Prerequisites: 3-credit enrollment requires functional knowledge and skills of linear algebra, calculus, Fourier transformation, and calculus-based physics.

For description, see BME 6180.

ECE 5210 Theory of Linear Systems (also MAE 5210)

Fall, 3 credits. Prerequisite: MAE 3260, ECE 3200, or permission of instructor.

Recommended: good background in linear algebra and linear differential equations.

For description, see MAE 5210.

ECE 5310 Quantum Optics for Photonics and Optoelectronics

Fall, 4 credits. Prerequisites: ECE 3060 and 4070, or PHYS 4443.

Introduces the basic concepts of quantum optics and quantum electronics necessary for understanding the behavior of optical fields in photonic and optoelectronic devices and systems. Topics include quantization of the electromagnetic field, quantum mechanical properties of photon states, vacuum fluctuations, noise and quantum Langevin equations, matter-photon interactions, phase-sensitive and phase-insensitive optical amplifiers, direct and coherent photon detection, lasers, parametric oscillators, and photonic devices for quantum information processing.

[ECE 5330 Semiconductor Optoelectronics

Fall, 4 credits. Prerequisites: ECE 4300, ECE 4570, or permission of instructor. Next offered 2010-2011.

Study of principles and characteristics of semiconductor lasers. Topics cover laser dynamics, noise, quantum confined structures, single-frequency lasers, traveling-wave lasers, surface-emitting lasers, reliability, and emerging research subjects. A term project and paper are required.]

ECE 5340 Power Semiconductor Devices

Spring, 3 credits. Prerequisites: ECE 4570.

It is estimated that at least 50 percent of the electricity used in the world is controlled by power electronics. The efficiency of power electronics circuits has a direct connection with energy conservation. This course seeks to introduce the student to basic power electronic devices, basic power electronic circuits, and their suitability for power applications spanning a large range of currents and voltages. Device operation, design, fabrication, and power electronic circuit issues will be discussed. Emphasis will

be on the device aspects. Examples will be drawn from current Si device technology as well as emerging power devices technologies developed from wide bandgap semiconductors.

[ECE 5350 Semiconductor Physics

Fall. 4 credits. Prerequisites: ECE 4070 and 4570, or permission of instructor. Offered alternate years from ECE 5370; next offered 2010–2011.

Physics of materials and structures useful in semiconductor electronic and photonic devices, including crystal structure, energy bands, effective mass, phonons, classical low-field transport, high-field and ballistic charge carrier transport, electron scattering by phonons, optical absorption, reflection, optical emissions, deep levels as charge carrier traps, and surface and interface effects.]

ECE 5360 Nanofabrication of Semiconductor Devices (also MSE 5410)

Fall. 4 credits. Prerequisites: ECE 3150 and ECE 4570 or equivalent.

Introduction to modern nanofabrication technologies used to produce integrated circuits. Students perform a series of fabrication steps including lithography, metallization, plasma etching and annealing to realize working semiconductor devices (Schottky diodes, pn junction diodes, MOS capacitors, and MOSFETs) in the lab. Prior knowledge of the operation of these devices is essential as each will be tested to verify the success (or failure) of the fabrication process.

ECE 5370 Nanoscale Devices, Circuits, and Physics

Fall, 4 credits. Prerequisites: ECE 4570 or permission of instructor. Offered alternate years from ECE 5350.

An integrated study connecting semiconductor physics with properties of electronic and optic devices at the nanoscale and the use of electronic devices in circuits. Topics include electronic and optic phenomena in confined structures and in nanoscale limits—single-electron phenomena, nanoscale quantum and size effects such as in tunneling and optical transitions, transistor operation in limited scattering limits, plasmonics, molecular transport, interface effects, and the unification of device attributes with implementation in circuits.

ECE 5470 Computer Vision

Fall. 4 credits. Prerequisites: ECE 2200 (or CS 2800 and 3420) or permission of instructor.

Covers computer acquisition and analysis of image data with emphasis on techniques for robot vision. Concentrates on descriptions of objects at three levels of abstraction: segmented images (images organized into subimages that are likely to correspond to interesting objects), geometric structures (quantitative models of image and world structures), and relational structures (complex symbolic descriptions of images and world structures). The programming of several computer-vision algorithms is required.

ECE 5540 Advanced Analog VLSI Circuit Design

Spring. 4 credits. Prerequisite: ECE 4530. Advanced analog integrated circuit and system design. Topics include integrated continuous-time filter design, translinear circuits and systems, dynamic analog techniques,

integrated discrete-time filter design, and Nyquist-rate data converter design.

[ECE 5580 Compound Semiconductor Electronics

Spring. 3 or 4 credits; 4 with a project. Prerequisite: ECE 4570 or equivalent. Next offered 2010–2011.

Electronic properties of advanced semiconductor structures using compound semiconductor materials and heterojunctions. Fundamentals of carrier transport and scattering. Properties of direct bandgap semiconductors and quantum wells. Advanced semiconductor devices, including metal-semiconductor transistors (FETs), modulation-doped FETs, and heterojunction bipolar transistors (HBTs). High-frequency operation of compound semiconductor devices. Includes six two-week labs, which include low-temperature carrier transport, optical absorption and emission, and electrical characterization of compound semiconductor devices.]

ECE 5610 Error Control Codes

Fall. 4 credits. Prerequisite: ECE 3200 or 5210 or equivalent; strong familiarity with linear algebra.

Introduction to the theory and practice of error control codes. Topics include algebraic codes, convolutional codes, concatenated codes, and codes on graphs. Considers the construction and decoding of Reed-Solomon (RS) codes in some detail as well as the iterative (turbo) decoding of concatenated codes and codes on graphs. The use of error control in wireless systems is discussed throughout the course.

ECE 5620 Fundamental Information Theory

Spring. 4 credits. Prerequisite: ECE 4110 or equivalent.

Fundamental results of information theory with application to storage, compression, and transmission of data. Entropy and other information measures. Block and variable-length codes. Channel capacity and rate-distortion functions. Coding theorems and converses for classical and multiterminal configurations. Gaussian sources and channels.

ECE 5640 Detection and Estimation

Fall. 4 credits. Prerequisites: ECE 3100, 4110, or permission of instructor.

Graduate-level introduction to fundamentals of signal detection and estimation with applications in communications. Elements of decision theory. Sufficient statistics. Signal detection in discrete and continuous time. Multiuser detection. Parameter estimations. Applications in wireless communications.

ECE 5660 Fundamentals of Networks

Fall. 4 credits. Prerequisite: ECE 3100 or equivalent course in probability.

Introductory course on tools and techniques for modeling communication networks, synthesis of network protocols, analysis of network protocols' operation, and performance evaluation of network protocols when deployed in a particular communication network. Analytical tools include advanced probability theory, discrete and continuous-time Markov Chains, queuing theory, and graph theory. Simulation methods and statistical tools for analysis of data obtained from simulation models are studied. The basic mechanisms used in designing communication protocols in wireless and

wired networks are illustrated by examples from numerous practical systems. Discussions of some classical papers help students learn about best practices as well as common mistakes occurring in studies of communication networks.

ECE 5670 Digital Communications

Fall. 4 credits. Prerequisites: ECE 3100, 4110, or permission of instructor.

Graduate-level introduction to fundamentals of digital communications. Complex random signals. Digital modulations and optimal receiver principles. Baseband and passband transmissions and processing. Interference channels and equalization techniques. Performance analysis including bit error rate calculation and bounds, cutoff rate and channel capacity. Applications in wireless and digital subscriber loops (DSL).

ECE 5680 Mobile Communication Systems

Spring. 4 credits. Prerequisites: ECE 4110 and 4670.

Theory and analysis of mobile communication systems, with an emphasis on understanding the unique characteristics of these systems. Topics include cellular planning, mobile radio propagation and path loss, characterization of multipath and fading channels, modulation and equalization techniques for mobile radio systems, source coding techniques, multiple access alternatives, CDMA system design, and capacity calculations.

[ECE 5710 Arithmetic Circuits

Fall. 3 or 4 credits. Prerequisites: ECE 4740, CS 2110. Offered alternate years from ECE 5740. Next offered 2010–2011.

Designing arithmetic circuits. Topics include number representation, high-performance arithmetic including addition, multiplication, division, and other common operations found in modern computer systems.]

ECE 5715 Computer Hardware Design Practicum

Fall. 4 credits. Prerequisite: ECE 4750 or permission of instructor.

This course will examine the hardware, and to some degree the software, necessary to build a complete computer system, including the CPU, memory, mass storage, input and output devices, and basic operating system functions. In a series of labs over the course of the semester, students will design and implement a working computer system using an FPGA development board.

ECE 5720 Parallel Computer Architecture (also CS 5420)

Fall. 4 credits. Prerequisite: ECE 4750.

Principles and trade-offs in the design of parallel architectures. Emphasis is on latency, bandwidth, and synchronization in parallel machines. Case studies illustrate the history and techniques of shared-memory, message-passing, dataflow, and data-parallel machines. Additional topics include memory consistency models, cache coherence protocols, and interconnection network topologies. Architectural studies presented through lecture and some research papers.

[ECE 5730 Memory Systems

Fall. 4 credits. Prerequisites: ECE 4750, ECE 5720 (co-requisite). Next offered 2010–2011.

Principles and current practices of memory system design. Topics include cache hierarchy optimization, high performance memory

controllers and technologies, approaches to power and reliability issues, exploiting memory level parallelism, memory systems for parallel computer architectures, and case studies.]

ECE 5740 Advanced Digital VLSI

Fall. 4 credits. Prerequisites: ECE 3140 and ECE 4740.

Top-down approach to asynchronous design and the relation between computer architecture and VLSI design. For the asynchronous design component: high-level synthesis, design by program transformations, and correctness by construction. Topics include delay-insensitive design techniques, description of circuits as concurrent programs, circuit compilation, and electrical optimizations. Students will complete a group project of the design of a microprocessor.

ECE 5750 Advanced Microprocessor Architecture

Spring. 4 credits. Prerequisite: ECE 4750 or CS 4420.

This course is a revised version of the former ECE 575 High-Performance Microprocessor Architecture. In addition to performance enhancement techniques of modern single-core microprocessors such as branch prediction and speculation methods, which have been the focus of ECE 5750, this course will also discuss reconfigurable architecture, on-chip interconnect, and non-performance issues such as security and verification.

ECE 5760 Advanced Microcontroller Design

Fall. 4 credits. Prerequisites: ECE 4750 and ECE 4760 or equivalent.

Design of system-on-chip applications. Students working in pairs design, debug, and construct several systems that illustrate the design of embedded processors with custom peripherals running a real-time operating system. The content focuses on laboratory work. The lectures are used primarily for the introduction of examples, description of specific modules to be designed, and instruction in the hardware and high-level design tools to be employed.

ECE 5770 Resilient Computer Systems

Spring. 4 credits. Prerequisite: ECE 4750.

Principles in designing resilient computer architectures. Topics include sources of faults and their manifestation, information redundancy, fault-tolerant hardware and software approaches, resilient parallel architectures and networks, security, modeling and evaluation, and case studies.

ECE 5780 Computer Analysis of Biomed Images (also BME 5780)

Spring. 4 credits. Prerequisite: permission of instructor; engineering, biomedical, or biology background.

Powerful imaging modalities with attending computer image processing methods are evolving for the evaluation of health and the detection of disease. This course focuses on the quantitative analysis of such images and Computer Aided Diagnosis (CAD), i.e., the automatic identification and classification of abnormalities by the computer.

ECE 5790 Advanced High-Speed and RF Integrated Circuits

Spring. 4 credits. Prerequisites: ECE 4330 and ECE 4530.

Principles of analog integrated circuit design in the Giga-Hertz frequency range. This course covers the fundamental understanding

of high-frequency circuit building blocks such as low noise amplifiers, mixers, oscillators, phase locked loops, frequency synthesizers, clock and data recoveries, and power amplifiers. Additionally, because some of the traditional microwave building blocks such as transmission lines and distributed circuit elements are essential parts of today's high speed integrated circuits, the course will briefly cover them. Throughout the course, a systematic review of advanced wireless and wireline applications would be covered. The course emphasizes physical understanding and intuitive design methods as well as qualitative techniques and computer simulations. The course has collaborative class projects, based on real-world problems.

ECE 5800 Control and Optimization of Information Networks

Spring. 4 credits. Prerequisites: ECE 4110 and ECE 4450. The focus may vary from year to year.

Introduction to current research directions in networking featuring the Internet. Assumes basic knowledge of signals and systems as well as random processes. Necessary tools from optimization, dynamical systems, and related economic theory will be introduced. Research topics may include layering, routing, medium access control, flow control, and peer-to-peer networks. Students are expected to hand in homework assignments, discuss one set of papers in class, and participate in a course project.

ECE 5810 Introduction to Plasma Physics (also AEP 6060)

Fall. 4 credits. Prerequisite: ECE 3030 or equivalent. First-year graduate-level course; open to exceptional seniors.

Topics include plasma state; motion of charged particles in fields; drift-orbit theory; coulomb scattering, collisions; ambipolar diffusion; elementary transport theory; two-fluid and hydromagnetic equations; plasma oscillations and waves, CMA diagram; hydromagnetic stability; and elementary applications to space physics, plasma technology, and controlled fusion.

[ECE 5820 Advanced Plasma Physics

Fall. 4 credits. Prerequisite: ECE 5810. Next offered 2010-2011.

Boltzmann and Vlasov equations; waves in hot magnetized plasma; Landau and cyclotron damping; micro-instabilities; low-frequency waves and instabilities; nonlinear phenomena: solitons, nonlinear waves, tearing, and reconnection.]

ECE 5830 Introduction to Technical Management

Fall. 3 credits. Prerequisite: industrial experience or equivalent (summer work or schoolwork).

This course is taught from the perspective of a chief technology officer and is targeted at M. Eng. and management students interested in "real world" problems. It provides an introduction via case examples to the technical, management, and organizational issues of developing and marketing products in high-tech businesses. The focus is on the unique nature of this type of business, including managing with high risk/uncertainty levels, learning to manage very diverse project teams, and recognizing technical versus market success in order to make good business decisions.

[ECE 5840 Advanced GPS Receiver Design

Spring. 4 credits. Prerequisite: ECE 4150 or MAE 4150. Next offered 2010-2011.

GPS receiver design from the RF section to the observables is investigated and implemented in MATLAB software. Creation of C/A code, upsampling, down conversion, code correlation, acquisition, tracking, and interpreting the navigation message. Students start with the digitized GPS bandwidth and build a software receiver to create the navigation solution as the final project.]

ECE 5850 Upper Atmospheric and Ionospheric Physics I

Fall. 4 credits. Prerequisites: PHYS through 2214 or equivalent, introductory chemistry, ECE 4860 or equivalent.

The structure and dynamics of the ionosphere and upper atmosphere. Charged particle production, loss and transport. Coupling to the neutral atmosphere. Ionospheric instabilities. High-latitude currents and plasma convection and its implications for the ionosphere and upper atmosphere.

ECE 5860 Upper Atmospheric and Ionospheric Physics II

Spring. 4 credits. Prerequisites: ECE 5810 and ECE 5850.

Topics include solar phenomena, solar wind, and space weather; magnetospheric structure and physical processes; plasma instabilities in the ionosphere and magnetosphere; and magnetic reconnection and the relation to high-latitude phenomena.

ECE 5870 Energy Seminar I (also CHEME 5870, MAE 5459)

Fall. 1 credit.

Energy resources, their conversion to electricity or mechanical work, and the environmental consequences of the energy cycle are discussed by faculty members from several departments in the university and by outside experts. Topics include energy resources and economics; coal-based electricity generation; nuclear reactors; solar power; energy conservation by users; and air pollution control.

ECE 5880 Energy Seminar II (also CHEME 5880, MAE 5469)

Spring. 1 credit.

For description, see ECE 5870; however, different speakers and/or topics are discussed in ECE 5880.

ECE 5890 Advanced Methods in Radar (also EAS 5880)

5950, fall; 5960, spring. 3 credits.

Prerequisites: EAS/ECE 4870 or permission of instructor.

For description, see EAS 5880.

ECE 5950-5960 Special Topics in Electrical and Computer Engineering

5950, fall; 5960, spring. 1-4 credits.

Seminar, special interest, or temporary course.

[ECE 6830 Seminar in GPS and GNSS

Fall, spring. 1-3 credits. Prerequisite: ECE/MAE 4150 or equivalent. Next offered 2010-2011.

Seminar in GPS (Global Positioning System) and GNSS (Global Navigation Satellite Systems) science and engineering. Current topics in receiver design such as low signal acquisition, ambiguity resolution, and software receivers and topics in GPS science such as space weather effects on GPS and the use of

GPS for remote sensing. Students typically make one presentation during the semester.]

ECE 6930-6931 Master of Engineering Design I & II

6930, fall; 6931, spring. 3-8 credits. Two-semester course: must enroll both semesters; will receive R grade for first semester. For students enrolled in M.Eng. (Electrical and Computer Engineering) degree program.

Uses real engineering situations to present fundamentals of engineering design. Each professor is assigned a class number. To enroll, students must complete a "Course Enrollment Petition" and submit it to the Graduate School. (See roster for appropriate class number.)

ECE 6950-6960 Special Topics in Electrical and Computer Engineering

6950, fall; 6960, spring. 1-credits.

Seminar, special interest, or temporary course.

ECE 6970-6980 Master of Engineering Research

6970, fall; 6980, spring. 7 credits.

Prerequisite: For students enrolled in M. Eng. (Electrical) degree Research Track program. Must enroll both semesters.

Project designed for the M.Eng. student in the Research Track program and more resembles a research thesis. Students will work closely with an ECE Graduate Field Faculty member on a common area of interest. Each professor is assigned a section number. To register, see roster for appropriate six-digit course ID numbers.

ECE 7910-7920 Thesis Research

7910, fall; 7920, spring. 1-15 credits. For students enrolled in master's or doctoral program. Each professor is assigned a section number. To register, see roster for appropriate six-digit course ID numbers.

INFORMATION SCIENCE, SYSTEMS, AND TECHNOLOGY

C. Cardie, director; W. Arms, G. Bailey, K. Bala, R. Caruana, E. Friedman, J. Gehrke, C. Gomes, J. Halpern, D. Huttenlocher, P. Jackson, T. Joachims, J. Kleinberg, L. Lee, D. Ruppert, P. Rusmevichientong, B. Selman, D. Shmoys, E. Tardos, D. Williamson

For complete descriptions, see the INFO listing in the CIS section.

INFO 1300 Introductory Design and Programming for the Web (also CS 1300)

Fall. 3 credits.

For description, see INFO 1300 in CIS section.

INFO 2040 Networks (also ECON 2040, SOC 2090) (SBA)

Spring. 4 credits.

For description, see ECON 2040.

INFO 2140 Cognitive Psychology (also COGST/PSYCH 2140) (KCM)

Spring. 4 credits. Limited to 175 students.

Prerequisite: sophomore standing.

Graduate students, see INFO 6140.

For description, see PSYCH 2140.

INFO 2300 Intermediate Design and Programming for the Web (also CS 2300)

Spring. 3 credits. Prerequisite: INFO 1300 strongly recommended. Must be taken before INFO 3300.

For description, see INFO 2300 in CIS section.

[INFO 2310 Topics in Web Programming and Design]

INFO 2450 Communication and Technology (also COMM 2450) (SBA)

Fall, summer. 3 credits.

For description, see COMM 2450.

INFO 2921 Inventing an Information Society (also AMST/ECE/ENGRG 2980, HIST 2920, STS 2921)

Spring. 3 credits.

For description, see ENGRG 2980.

INFO 2950 Mathematical Methods for Information Science

Spring. 4 credits. Corequisite: MATH 2310 or equivalent.

For description, see INFO 2950 in CIS section.

INFO 3200 New Media and Society (also COMM 3200)

Spring. 3 credits.

For description, see COMM 3200.

INFO 3300 Data-Driven Web Applications (also CS 3300)

Spring. 3 credits. Prerequisite: CS 2110 and (INFO 2300 or permission of instructor).

For description, see INFO 3300 in CIS section.

[INFO 3400 Psychology of Social Computing (also COMM 3400)]

Fall. 3 credits. Prerequisite: INFO 2450.

Next offered 2010-2011.

For description, see COMM 3400.]

INFO 3450 Human-Computer Interaction Design (also COMM 3450) (SBA)

Fall. 3 credits. Prerequisite: INFO 2450 or permission of instructor. May be taken simultaneously with INFO 2450.

For description, see COMM 3450.

[INFO 3490 Media Technologies (also COMM 3490, STS 3491) (CA)]

Spring. 3 credits. Offered odd-numbered years; next offered 2010-2011.

For description, see COMM 3491.]

[INFO 3551 Computers: From the 17th Century to the Dotcom Boom (also STS 3551) (HA)]

INFO 3561 Computing Cultures (also STS 3561)

Spring. 4 credits. No technical knowledge of computer use presumed or required.

INFO 3551 and 3561 may be taken separately or in any order.

For description, see STS 3561.

INFO 3650 Technology and Collaboration (also COMM 3650)

Spring. 3 credits. Prerequisite: INFO 2450.

For description, see COMM 3650.

[INFO 3660 History and Theory of Digital Art (also ARTH 3650) (CA)]

Fall. 4 credits. Next offered 2010-2011.

For description, see ARTH 3650.]

INFO 4290 Copyright in the Digital Age (also COMM 4290)

Fall. 3 credits. Offered odd-numbered years.

For description, see COMM 4290.

INFO 4300 Information Retrieval (also CS 4300)

Fall. 3 credits. Prerequisite: CS/ENGRD 2110 or equivalent.

For description, see INFO 4300 in CIS section.

INFO 4302 Web Information Systems (also CS 4302)

Spring. 3 credits. Prerequisites: CS 2110 and some familiarity with web site technology.

For description, see INFO 4302 in CIS section.

[INFO 4350 Seminar on Applications of Information Science (also INFO 6350)]

INFO 4400 Advanced Human-Computer Interaction Design (also COMM 4400) (SBA)

Spring. 3 credits. Prerequisite: INFO 3450.

For description, see COMM 4400.

INFO 4450 Seminar in Computer-Mediated Communication (also COMM 4450)

Fall. 3 credits. Prerequisite: INFO 2450.

For description, see COMM 4450.

INFO 4470 Social and Economic Data (also ILRLE 4470)

Fall. 4 credits. Prerequisites: one semester of calculus, IS statistics requirement, one upper-level social science course, or permission of instructor.

For description, see INFO 4470 in CIS section.

INFO 4500 Language and Technology (also COMM 4500) (SBA)

Spring. 3 credits. Prerequisite: INFO 2450 or permission of instructor.

For description, see COMM 4500.

INFO 4900 Independent Reading and Research

Fall, spring. 1-4 credits.

INFO 4910 Teaching in Information Science, Systems, and Technology

Fall, spring. Variable credit.

[INFO 5150 Culture, Law, and Politics of the Internet]

INFO 5300 The Architecture of Large-Scale Information Systems (also CS 5300)

Spring. 4 credits. Prerequisite: INFO 3300 or CS 4320.

For description, see INFO 5300 in CIS section.

INFO 6140 Cognitive Psychology (also COGST/PSYCH 6140)

Spring. 4 credits.

For description, see PSYCH 6140.

INFO 6300 Advanced Language Technologies (also CS 6740)

Fall, spring. 3 credits. Prerequisite: permission of instructor. Neither INFO/CS 4300 nor CS 4740 are prerequisites.

For description, see CS 6740 in CIS section.

INFO 6341 Information Technology in Sociocultural Context (also STS 6341)

Spring. 4 credits.

For description, see INFO 6341 in CIS section.

[INFO 6350 Seminar on Applications of Information Science (also INFO 4350)]

INFO 6400 Human-Computer Interaction Design (also COMM 6400)

Spring, 3 credits. Prerequisite: graduate standing or permission of instructor. For description, see COMM 6400.

INFO 6450 Seminar in Computer-Mediated Communication (also COMM 6450)

Spring, 3 credits. Prerequisite: graduate standing or permission of instructor. For description, see COMM 6450.

INFO 6500 Language and Technology (also COMM 6500)

Spring, 3 credits. Prerequisite: graduate standing or permission of instructor. For description, see COMM 6500.

[INFO 6648 Speech Synthesis by Rule (also LING 6648)]

Spring, 4 credits. Prerequisite: LING 4401, 4419, or permission of instructor. Next offered 2010-2011. For description, see LING 6648.]

[INFO 6850 The Structure of Information Networks (also CS 6850)]**INFO 7050 Graduate Seminar**

Fall, spring, 1 credit. For description, see INFO 7050 in CIS section.

INFO 7090 IS Colloquium

Fall, spring, 1 credit. For staff, visitors, and graduate students interested in information science.

INFO 7900 Independent Research

Fall, spring. Variable credit. Prerequisite: permission of an information science faculty member. Independent research for M.Eng. students and pre-A exam Ph.D. students.

INFO 9900 Thesis Research

Fall, spring. Variable credit. Prerequisite: permission of an information science faculty member. Thesis research for post-A exam Ph.D. students.

MATERIALS SCIENCE AND ENGINEERING

E. P. Giannelis, director; D. G. Ast, S. P. Baker, J. M. Blakely, R. Dieckmann, L. Estroff, D. Gourdon, D. T. Grubb, R. Hennig, C. Liddell, G. G. Malliaras, C. K. Ober, R. Robinson, D. G. Schlom, M. O. Thompson, C. C. Umbach, R. B. van Dover, U. B. Wiesner

Undergraduate Courses**MSE 1110 Nanotechnology (also ENGRI 1110)**

Fall, 3 credits. C. Umbach. Course in Introduction to Engineering series. For description, see ENGRI 1110.

MSE 1140 Materials: The Future of Energy

Spring, 3 credits. R. B. van Dover. This experiential learning course will explore how new materials can increase our energy supply and decrease consumption. Materials issues in photovoltaic, fuel cell, battery, wind, transportation, lighting, and building technologies will be studied. Through integrated lab-based activities students will develop a broad understanding of materials issues in

order to successfully design and build an energy generation system.

MSE 1180 Design Integration: DVDs and iPods (also ENGRI/TAM 1180)

Spring, 3 credits. Course in Introduction to Engineering series. For description see ENGRI 1180.

MSE 1190 Biomaterials for the Skeletal Systems (also ENGRI 1190)

Fall, 3 credits. D. Grubb. Course in Introduction to Engineering series. For description, see ENGRI 1190.

MSE 1810 MSE at Cornell: an Introduction for Freshmen

Spring, 1 credit. S-U or letter grades; grade based on class participation and course project. C. Umbach.

Introduces materials science and engineering to students considering MSE as their major. Lectures by MSE professors, alumni, and industrial researchers. Topics covered include MSE major requirements as preparation for real-world engineering. Cutting-edge MSE research involving undergraduates. Industrial R&D. Tours of Cornell centers and MSE facilities.

MSE 1910-1920 Research Involvement Ia and Ib

1910, fall; 1920, spring, 3 credits each semester. Prerequisite: approval of department. Staff. For description, see MSE 2910. May be continuation or a one-semester affiliation with a research group.

MSE 2060 Atomic and Molecular Structure of Matter (also MAE 3130)

Spring, 4 credits. R. Robinson. Discusses the basic elements of structure; order and disorder; ideal gas; crystals; liquids; amorphous materials; polymers; liquid crystals; composites; crystal structure; x-ray diffraction.

MSE 2610 Mechanical Properties of Materials: From Nanodevices to Superstructures (also ENGRD 2610)

Fall, 3 credits. Prerequisite: MATH 1910. Corequisite: PHYS 1112 or permission of instructor. S. P. Baker. For description, see ENGRD 2610.

MSE 2620 Electronic Materials for the Information Age (also ENGRD 2620)

Spring, 3 credits. Prerequisite: MATH 1920. Corequisite: PHYS 2213 or permission of instructor. M. Thompson. For description, see ENGRD 2620.

MSE 2910-2920 Research Involvement IIa and IIb

2910, fall; 2920, spring, 3 credits each semester. Prerequisite: approval of department. Staff. Supervised independent research project in association with faculty members and faculty research groups of the department. Students design experiments, set up the necessary equipment, and evaluate the results. Creativity and synthesis are emphasized. Each semester may be taken as a continuation of a previous project or as a one-semester affiliation with a research group.

MSE 3010 Materials Chemistry (also MSE 5810)

Fall, 3 credits. U. Wiesner. Provides a molecular understanding of materials properties: quantum chemistry, symmetry aspects of chemical bonding, solid state reactions, and electrochemistry. Materials

include polymers, organic semiconductors, organic-inorganic hybrids, and biomaterials.

MSE 3030 Thermodynamics of Condensed Systems (also MSE 5830)

Fall, 4 credits. Prerequisites: PHYS 2214 and MATH 2940. M. O. Thompson. Introduces the three laws of thermodynamics as the fundamental basis for thermal and chemical equilibrium, coupled with statistical mechanical interpretations for entropy and specific heat capacities. Applies these principles to understanding phase equilibria and phase diagrams, heterogeneous reactions, solutions, surfaces, and defects. Introduces electrochemistry and fuel/power cells.

MSE 3040 Kinetics, Diffusion, and Phase Transformations (also MSE 5840)

Spring, 4 credits. Prerequisite: MSE 3030 or permission of instructor. R. Hennig. Topics include phenomenological and atomistic theories of diffusion; diffusion in metals, alloys, and nonmetals, including polymers; diffusion in the presence of driving forces; fast diffusion paths; thermo- and electrotransport; interfaces and microstructure; nucleation and growth; growth of product layers (parabolic and linear kinetics); solidification of alloys; diffusional and diffusionless transformations in solids; glass transition.

MSE 3050 Electronic, Magnetic, and Dielectric Properties of Materials (also MSE 5850)

Spring, 3 credits. Prerequisite: MSE 2060 and MSE 2620 or permission of instructor. D. Schlom.

Electronic structure of materials and connection to transport, magnetic, and dielectric properties. Wave and particle nature of electrons, wave packets, potential wells, barriers, tunneling. Valence electron behavior in crystals, density of states for metals, Fermi level, field and thermionic emission, Schottky barriers. Periodic potentials and band structure of crystals. Intrinsic and doped semiconductors, junction electronic and optical devices. Physical origin of magnetic behavior, ferromagnetic domains, magneto-resistance. Materials for data storage and manipulation. Polarization in dielectric materials; frequency dependence of dielectric constants and refractive indices. Ferroelectric domains. Dielectric components in devices. The close connection between fundamental concepts and current technology is emphasized.

MSE 3070 Materials Design Concepts I

Fall, 2 credits. C. Liddell. For description, see MSE 4070.

MSE 3110 Junior Laboratory I

Fall, 1 credit. Staff. Practical laboratory covering the analysis and characterization of materials and processing. Labs are based on materials from courses in chemistry of materials and thermodynamics of condensed systems.

MSE 3120 Junior Laboratory II

Spring, 1 credit. Staff. Practical laboratory covering the analysis and characterization of materials and processing. Labs are based on course material in kinetics, diffusion, and phase transformation and electronic, magnetic, and dielectric properties of materials.

MSE 3910–3920 Research Involvement IIIa and IIIb

3910, fall; 3920, spring. 3 credits each semester. Prerequisite: departmental approval. Staff.

For description, see MSE 2910. May be continuation or a one-semester affiliation with a research group.

MSE 4020 Mechanical Properties of Materials, Processing, and Design (also MAE 3120, MSE 5820)

Fall. 3 credits. Prerequisite: MSE 2060. Corequisite: MSE 3040 or permission of instructor. D. Ast.

Relationship between microscopic mechanisms and macroscopic mechanical behavior of engineering materials, how mechanical properties can be modified, and criteria for selection and use of materials in design. Stress, strain and elastic constants as tensor quantities, viscoelasticity and damping, plastic deformation, creep deformation, fracture, and fatigue.

MSE 4030–4040 Senior Materials Laboratory I and II

4030, fall; 4040, spring. 3 credits each semester. D. Grubb.

Practical laboratory covering the analysis and characterization of materials and processing. Emphasis is on design of experiments for evaluation of materials' properties and performance as related to processing history and microstructure. Projects available in areas such as plasticity, mechanical and chemical processing, phase transformations, electrical properties, magnetic properties, and electron microscopy.

MSE 4050–4060 Senior Thesis I and II

4050, fall; 4060, spring. 4 credits each semester. Requirement for graduation with honors. Open to advanced undergraduates in lieu of senior materials laboratory. M. Thompson.

Proposals for thesis topics should be approved by the supervising faculty member before beginning the senior year. Approved thesis topics normally involve original experimental research in direct collaboration with an ongoing research program. Periodic oral and written presentations and a final written thesis are required. Students must take both semesters to complete the laboratory requirement.

MSE 4070 Materials Design Concepts II

Fall. 2 credits. C. Liddell.

Introduces materials design in the context of real-world materials design projects carried out in industry. In the first portion of the course, the process of engineering design is studied in light of economic, environmental, regulatory, and safety issues. Patent searching and communication skills are addressed. In the second portion, speakers from industry lecture on case studies of materials design problems. Students give oral presentations and write technical reports based on case studies.

MSE 4100 Physical Metallurgy and Applications (also MSE 6100)

Spring. 3 credits. Prerequisites: MSE 2060, 3030, 3040 or permission of instructor. S. Baker.

Microstructure and properties of metals and alloys: processing, structure, defects, phase stability, diffusion, deformation, fracture, corrosion, conductivity, optical properties. Applications of metallurgical principles to high performance metallic materials include thin

films and patterned structures for use in microelectromechanical systems, superalloys for high-temperature engine applications, shape memory alloys for biomedical applications, and others.

MSE 4330 Materials for Energy Production, Storage, and Conversion (also MSE 5330)

Fall. 3 credits. R. Dieckmann.

Concerned with materials and technologies related to energy production, storage, and conversion as well as to sensors used for monitoring the emission of pollutants. The devices discussed include solar cells, fuel cells, batteries, and electrochemical sensors. Thermodynamic, kinetic, and electrochemical concepts and materials properties critical for such devices are the central part of this course.

MSE 4610 Biomedical Materials and Their Applications

Spring. 3 credits. L. Estroff.

Many types of materials are used in biomedical engineering to replace or supplement natural biological systems. Interaction with blood and tissues is always of primary importance, but depending on the use of the biomedical material, mechanical, optical, and transport properties may also be vital. After a general introduction to biomedical materials, case studies involving physiological systems are considered, and design of artificial parts and materials is investigated. Constraints such as methods of production, economics, regulatory approval, and legal liabilities are included. Examples may include dialysis, contact and intra-ocular lenses, heart valves, and the artificial pancreas. Every student is involved in a presentation about a case study.

[MSE 4810 Technology Management (also MSE 5870)]

Spring. 3 credits. E. P. Giannelis. Next offered 2010–2011.

Designed to provide students in engineering and the sciences with the knowledge and analytical skills to manage RD for a strategic competitive advantage. Most organizations recognize the critical importance of RD management in becoming and remaining world-class competitors. The course uses a combination of case studies, readings, discussions, and outside lectures. Topics include technology evaluation, RD portfolio, intellectual property portfolio and management, technology transfer, and technology, policy, and society.]

MSE 4820 Plasma Processing of Electronic Materials (also ECE 4820)

Spring. 3 credits. Prerequisites: PHYS 2213 and 2214 or equivalents. Offered if sufficient demand.

For description, see ECE 4820.

[MSE 4870 Ethics and Technology]

Spring. 1 credit. Next offered 2010–2011. Staff.

Ethics influences all decisions made by a technologist. This course discusses those factors that must be considered in reaching a decision involving technology, ranging from legal impact to consideration of community expectations.]

[MSE 4890 Colloids and Colloid Assemblies for Advanced Materials Applications (also MSE 5890)]

Fall. 3 credits. Next offered 2010–2011. C. Liddell.

Recent global developments in the synthesis, modification, organization, and utilization of fine particles in nanotechnology and biotechnology fields. Underlying principles for control of particle characteristics such as mean size, shape, composition, internal homogeneous structure, layered, hollow, porous, and heterojunction structures. Methods for the formation of ordered and patterned particle arrays employed in advanced materials based on latex, ceramic colloids, metal nanoparticles, semiconductor quantum dots, nanocapsules, and miniemulsions. Applications in photonics, biolabeling, biological screening, drug delivery, catalysis, and magnetic recording.]

MSE 4910–4920 Research Involvement IVa and IVb

4910, fall; 4920, spring. 3 credits each semester. Prerequisite: departmental approval. Staff.

For description, see MSE 2910. May be continuation or a one-semester affiliation with a research group.

MSE 4950 Undergraduate Teaching Involvement

Fall, spring. Variable credit. Staff.

Gives credit to students who help in the laboratory portions of select MSE courses. The number of credits earned is determined by the teaching load and is typically 1–3.

MSE 5010–5020 Special Project

Fall, spring. 6 credits. Staff.

Master of Engineering research project.

[MSE 5120 Mechanical Properties of Thin Films (also MAE 5130)]

Spring. 3 credits. Prerequisite: A course similar to ENGRD 2610 or permission of instructor. S. P. Baker. Next offered 2010–2011.

Stresses, elastic and plastic deformation, creep and anelasticity, and fracture and delamination of thin films and patterned structures. How mechanical behavior at the nanoscale deviates from the predictions of scaling laws derived for bulk materials. Applications in microelectronics, optics, microelectromechanical systems, coatings, etc.]

MSE 5210 Properties of Solid Polymers

Spring. 3 credits. Prerequisite: ENGRD 2610. Corequisite: MSE 3030 or permission of instructor. C. Ober.

Synthetic and natural polymers for engineering applications. Production and characterization of long-chain molecules. Thermodynamics of polymer mixtures. Polymer molecular weight. Gelation and networks, rubber elasticity, elastomers, and thermosetting resins. Amorphous and crystalline thermoplastics and their structure. Time- and temperature-dependent elastic properties of polymers. Glass transition and secondary relaxations. Plastic deformation and molecular orientation.

[MSE 5230 Physics of Soft Materials]

Fall. 3 credits. Next offered 2010–2011. U. Wiesner.

The course covers general aspects of structure, order, and dynamics of soft materials. Typical representatives of this class of materials are polymers, liquid crystals, gels, and surfactant solutions. A general formalism for the description of order in terms of orientation distribution functions is introduced. Examples are given for the measurement of order parameters for partially ordered materials. Finally, the dynamics of soft materials is

discussed. Besides transport and flow behavior aspects of the local dynamics of soft materials are presented. Emphasis is put on the discussion of various techniques frequently used (and available at Cornell) for the characterization of structure, order and dynamics of soft materials such as NMR or various scattering techniques. Using examples of modern multidimensional spectroscopic methods the issue of heterogeneous dynamics at the glass transition of amorphous liquids is presented at the end of the class.]

[MSE 5310 Introduction to Ceramics

Spring, 3 credits. Prerequisites: all MSE 2000- and 3000-level core courses. Next offered 2010–2011. R. Dieckmann.

Covers ceramic processes and products, structure of ceramic crystals, structure of glasses, structural defects (point defects, dislocations), surfaces, interfaces and grain boundaries, diffusion in ionic materials (atomistic and phenomenological approach, relationships between diffusion and point defect structure), ceramic phase diagrams, phase transformations. Emphasizes physicochemical aspects of the different topics.]

MSE 5330 Materials for Energy Production, Storage, and Conversion (also MSE 5330)

Fall, 3 credits. R. Dieckmann.
For description, see MSE 4330.

MSE 5410 Nanofabrication of Semiconductor Devices (also ECE 5360)

Fall, 4 credits. Prerequisites: ECE 3150 and ECE 4570 or equivalent.
For description, see ECE 5360.

[MSE 5420 Flexible Electronics

Spring, 3 credits. Next offered 2010–2011.
C. Ober.

Flexible electronics holds the promise of transformative developments in: (1) flat panel lighting (low cost, low energy), (2) energy production systems (solar), and (3) infrastructure control and monitoring (sensing, energy control, hazard monitoring). Practical realization of flexible circuits will require dramatic progress in new materials that are compatible with flexible media and amenable to facile and low temperature processing as well as major advances in manufacturing technologies such as roll-to-roll processing. This course will discuss these and other developments.]

MSE 5430 Thin-Film Materials Science

Fall, 3 credits. D. Schlom.
Provides fundamental information on the deposition, properties, reaction, and evaluation of thin films. Topics include deposition techniques, surface energies, stress in thin films, surface kinetics, homoepitaxy, heteroepitaxy and superlattices, electrical and optical properties, Schottky barriers, solid phase regrowth, interdiffusion, thin film reactions, and electromigration. The recommended textbook is *Electronic Thin Film Science for Electrical Engineers and Material Scientists* by Tu, Mayer, and Feldman.

[MSE 5450 Magnetic and Ferroelectric Materials

Fall, 3 credits. Prerequisites: PHYS 2213 and 2214 or equivalent. R. B. van Dover.
Next offered 2010–2011.

Topics include magnetic fields, the microscopic origins of magnetism, ferromagnetic materials and properties, and

applications of magnetic materials. The properties of ferroelectric materials are also covered, and applications of ferroelectrics in electronics technology are explored.]

MSE 5490 Nanofabrication: Making It Small

Spring, 3 credits. Prerequisites: CHEM 2090, MATH 1920. M. Thompson.

This course provides an introduction to principles and practice of nanofabrication techniques, combining lectures with hands-on laboratory fabrication. A range of nanosystems will be explored from microelectronic circuits to MEMS sensors and/or microfluidics. Fundamentals common to all fabrication including lithography, deposition, and etching processes are explored in lectures and lab exercises. New developments in “soft” microstamp lithography and self-assembly methods are discussed. In the final project students build one of several nanosystems depending on their particular interests.

MSE 5550 Introduction to Composite Materials (also CEE/MAE/TAM 4550)

Fall, 3 credits. P. Petrina.
For description, see TAM 4550.

[MSE 5620 Biomineralization: The Formation and Properties of Inorganic Biomaterials

Spring 3 credits. Prerequisites: MSE 3010 or CHEM 1570 or CHEM 3570–3580 or equivalent or permission of instructor.
L. Estroff. Next offered 2010–2011.

This course will examine the wide variety of mineralized materials made by biological organisms including mollusk shells, mammalian bone and teeth, silica bodies in plants, and magnetotactic bacteria. The focus will be on the molecular and biological mechanisms that lead to the formation of these materials as well as their unique materials properties (mechanical, optical, magnetic.)]

MSE 5630 Nanobiotechnology (also AEP/ BIOG 6630)

Fall, 3 credits.
For description, see BME 6670.

MSE 5710 Analytical Techniques for Material Science

Spring, 3 credits. D. Grubb.

Survey of modern analytical techniques used to determine composition and structure of near-surface and bulk materials. Interaction of ions, electrons, and photons with solids; characteristics of the emergent radiation. Techniques covered include ion scattering, Auger electron spectroscopy, nuclear activation, secondary ion mass spectroscopy, UV and X-ray photoelectron spectroscopies, and X-ray techniques. Selection and design of experiments.

MSE 5720 Computational Materials Science

Fall, 3 credits. Prerequisite: MSE 3030/6010 or equivalent. R. Hennig.

Computational methods for predicting the behavior of condensed matter systems, including Monte Carlo, molecular dynamics, and phase field approaches. Extraction of physical parameters from simulation results and limitations of computational methods. Survey of interatomic potential development and quantum-mechanical ab-initio techniques. Examples drawn from surface and condensed phase systems.

MSE 5810 Materials Chemistry (also MSE 3010, MAE 3120)

Fall, 3 credits. U. Wiesner.
For description, see MSE 3010.

MSE 5820 Mechanical Properties of Materials, Processing, and Design (also MSE 4020, MAE 3120)

Fall, 3 credits. Corequisite: MSE 5840 or permission of instructor. D. Ast.
For description, see MSE 4020.

MSE 5830 Thermodynamics of Condensed Systems (also MSE 3030)

Fall, 4 credits. M. O. Thompson.
For description, see MSE 3030.

MSE 5840 Kinetics, Diffusion, and Phase Transformation (also MSE 3040)

Spring, 4 credits. Prerequisite: MSE 5830 or permission of instructor. R. Hennig.
For description, see MSE 3040.

MSE 5850 Electronic, Magnetic, and Dielectric Properties of Materials (also MSE 3050)

Spring, 3 credits. D. Schlom.
For description, see MSE 3050.

[MSE 5870 Technology Management (also MSE 4810)

Spring, 3 credits. Next offered 2010–2011.
E. P. Giannelis.
For description, see MSE 4810.]

[MSE 5890 Colloids and Colloid Assemblies for Advanced Materials Applications (also MSE 4890)

Fall, 3 credits. Next offered 2010–2011.
C. Liddell.
For description, see MSE 4890.]

Graduate Core Courses

MSE 6010 Chemistry of Materials

Spring, 3 credits. Prerequisite: thermodynamics course at level of MSE 3030.
U. Wiesner.

In this course modern developments in materials chemistry are taught and discussed. This includes symmetry aspects of chemical bonding, self-assembly, sol-gel chemistry, mesostructured and mesoporous solids, low-dimensional nanomaterials, and bioorganic chemistry.

[MSE 6020 Elasticity, Plasticity, and Fracture

Spring, 3 credits. D. Ast. Next offered 2010–2011.

An advanced overview of mechanical properties of materials combining concepts from continuum mechanics, atomic structure, thermodynamics, and kinetics. Topics include elastic properties of crystals, glasses, and polymers; mechanical damping; plastic deformation in metals and polymers; creep deformation; fracture in brittle and ductile materials; the effects of temperature, time, and thermomechanical history on properties; metals, ceramics, polymers, and composites; and models and scaling laws for mechanical behavior.]

MSE 6030 Thermodynamics of Materials

Fall, 3 credits. Staff.
Topics include basic statistical thermodynamics, partition functions and thermodynamic state functions, distributions, laws of thermodynamics, free-energy functions and conditions of equilibrium, chemical reactions, statistics of electrons in crystals, heat capacity, heterogeneous systems and phase transitions, and lattice models of 1-, 2-, and

3-dimensional interacting systems. Also covers statistical thermodynamics of alloys, free-energy and phase diagrams, order-disorder phenomena, point defects in crystals, and statistical thermodynamics of interfaces.

MSE 6040 Kinetics of Reactions in Condensed Matter

Spring. 3 credits. R. Dieckmann. Phenomenology and microscopic aspects of diffusion in fluids, both simple and polymeric, and in metallic, ionic, semiconductor, and polymeric solids. Cartesian tensors are utilized for fields and properties. Covers phase stability and transformations; nucleation and growth, spinodal decomposition and displacive transformations; phase coarsening processes, recrystallization, and grain growth; diffusion-controlled growth, interfacial reactions, moving boundary problems; grain-boundary migration controlled kinetics; viscosity, anelasticity, and diffusional creep.

[MSE 6050 Electronic Properties of Materials

Spring. 3 credits. D. Schlom. Next offered 2010–2011.

Develops concepts of band structure in crystalline and non-crystalline materials from a real-space as well as reciprocal space perspective, and reconciles the two approaches. Mathematical complexity is kept to a minimum. Specific topics include electronic properties of low-dimensionality materials (surfaces, quantum wires, quantum dots), optical properties of metals and insulators, and electronic properties of exotic materials such as oxide and organic semiconductors. Technological applications to be addressed include switching devices, magnetism, superconductivity, and photonics, depending on student interests.]

MSE 6060 Condensed Matter Structure

Fall. 3 credits. Prerequisite: course at level of MSE 2060. R. Robinson.

Focuses on ways to characterize structure. Includes lectures by several faculty on structural determination on a wide range of materials. Elements of structure at length scales ranging from sub-nanometer to millimeter. Descriptions of structure in crystals, liquids, amorphous solids/glasses. Short- and long-range order, microstructures, cellular structures, domains, domain boundaries, 2-phase and composite structures. Techniques to probe structure: “direct” microscopy, real space imaging, including probe microscopies, optical, electron and X-ray methods. Indirect methods based on analysis of diffraction fields, Fourier/reciprocal space. Examples of application may include polymer structure, metal grain textures, dislocation arrays, cellular structure, structure of biological membranes, nano-composite structures, surfaces, interfaces and grain boundaries in semiconductors, structure of photonic materials, domain structures in ferroelectrics and ferromagnetics, biological materials.

Related Course in Another Department

Introductory Solid-State Physics (PHYS 4454, AEP 4500)

Further Graduate Courses

MSE 6100 Physical Metallurgy and Applications (also MSE 4100)

Spring. 3 credits. Prerequisites: MSE 2060, 3030, 3040 or permission of instructor. S. Baker.

For description, see MSE 4100.

MSE 6210 Advanced Inorganic Chemistry III: Solid-State Chemistry (also CHEM 6070)

Spring. 4 credits. Prerequisite: CHEM 6050 or permission of instructor. S. Lee. For description, see CHEM 6070.

MSE 6550 Composite Materials (also MAE/TAM 6550)

Spring. 4 credits. Staff. For description, see TAM 6550.

MSE 6650 Principles of Tissue Engineering (also MAE/BME 6650)

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. For description, see BME 6650.

MSE 6710 Principles of Diffraction (also AEP 7110)

Spring. 3 credits. Letter grades only. Assumes some knowledge of statistical thermodynamics, crystallography, elementary quantum mechanics, and theory of rate processes. J. D. Brock. For description, see AEP 7110.

Specialty Courses

MSE 8000 Research in Materials Science

Fall, spring. Credit TBA. Staff. Independent research in materials science under the guidance of a member of the staff.

MSE 8010 Materials Science and Engineering Colloquium

Fall and spring. 1 credit each semester. Enrollment limited to MSE Ph.D. students. Staff. Lectures by visiting scientists, Cornell staff members, and graduate students on subjects of interest in materials sciences, especially in connection with new research.

MSE 8020 Materials Science Research Seminars

Fall, spring. 2 credits each semester. Prerequisite: graduate students involved in research projects. Staff. Short presentations on research in progress by students and staff.

MECHANICAL AND AEROSPACE ENGINEERING

P. L. Auer, C. T. Avedisian, D. L. Bartel, L. J. Bonassar, J. F. Booker, J. R. Callister, M. E. Campbell, D. A. Caughey, L. R. Collins, P. R. Dawson, P. C. T. deBoer, D. C. Erickson, E. M. Fisher, Y. Gao, E. Garcia, A. R. George, F. C. Gouldin, B. Hency, C. Hui, B. J. Kirby, H. Kress Gazit, S. Leibovich, H. Lipson, M. Y. Louge, J. L. Lumley, M. P. Miller, F. C. Moon, F. K. Moore, S. Mukherjee, M. A. Peck, R. M. Phelan, S. L. Phoenix, S. B. Pope, M. L. Psiaki, E. L. Resler, Jr., A. Ruina, W. Sachse, K. E. Torrance, M. C. H. van der Meulen, H. B. Voelcker, K. K. Wang, Z. Warhaft, C. H. K. Williamson, N. Zabarar, A. Zehnder, K. M. Zhang

MAE 1110 Naval Ship Systems (also NAVS 2202)

Fall. 3 credits. For description, see NAVS 2020.

MAE 1130 Introduction to Computer-Aided Manufacture (CAM)

Fall, approx. ten weeks (total 20 hrs. of instruction and 20 hrs. of lab). 1 credit. Limited enrollment. Prerequisites: MAE 2250 or equivalent experience or permission of instructor. Introduction to the fundamentals of computer-aided manufacture (CAM) and computer numerical control (CNC) programming. The course is a hands-on series on CAM. Provides practical applications of the use of G codes and solid modeling software, CNC mill and/or lathe setup, tool selection, and operation. The course is required for students wishing to use the CNC equipment in the Emerson Labs Product Realization Facility for team or research projects. It is also required for advanced CAM/CNC work offered on an individual basis in the spring. May not be used to fulfill any MAE requirement.

MAE 1170 Introduction to Mechanical Engineering (also ENGR1 1170)

Fall. 3 credits. 2 lec and 1 lab per week. Course in Introduction to Engineering series. For description, see ENGR1 1170.

MAE 1270 Introduction to Entrepreneurship and Enterprise Engineering (also ENGR1 1270)

Spring. 3 credits. Open to all Cornell students regardless of major. Prerequisites: none. For description, see ENGR1 1270.

MAE 2120 Mechanical Properties and Selection of Engineering Materials

Spring; may be offered in summer. 3 credits. Prerequisites: ENGRD/TAM 2020 (Statics) with minimum of C– (strictly enforced); MATLAB programming at level of CS 1112 or CS 1132. Mechanics of deformable bodies and a reinforcement of the concept of “simple engineering elements” for mechanical analysis associated with design. Introduction to the broad range of properties and behaviors of engineering materials as they relate to mechanical performance. Emphasis is placed on general states of stress and strain, on elasticity and combined loading effects. Failure criteria including yielding, buckling, fracture, fatigue, and environmental effects are developed. A general introduction to the function/constraints/objectives approach to material selection associated with mechanical design is provided with candidate material systems coming from metals, polymers, ceramics, and/or composites. A general overview of material structure and processing is presented within this context of material selection.

MAE 2210 Thermodynamics (also ENGRD 2210)

Fall, spring, may be offered in summer. 3 credits. Prerequisites: MATH 1920 Calculus for Engineers and PHYS 1112 Physics I, Mechanics, or permission of instructor. For description, see ENGRD 2210.

MAE 2250 Mechanical Synthesis

Spring. 4 credits. Prerequisite: ENGRD 2020. Pre- or corequisites: ENGRD 2030 and 2210. Lab fee. Hands-on introduction on the product design process, from conceptualization through prototype construction and testing. Design projects provide experience in basic prototyping skills using machine tools. Mechanical dissection used to demonstrate successful product design and function. Basic instruction in CAD and technical sketching.

MAE 3050 Introduction to Aeronautics

Fall. 3 credits. Prerequisite: TAM/ENGRD 2030. Pre- or corequisites: one of the following thermodynamics classes: ENGRD 2210 or BEE 2220 and one of the following fluid mechanics classes: MAE 3230 or CHEME 3230 or BEE 3310 or CEE 3310; upper-level engineers or permission of instructor.

Introduction to aerodynamic design of aircraft. Principles of incompressible and compressible aerodynamics, boundary layers, and wing theory. Calculation of lift and drag for aircraft. Analysis of aerodynamic performance. Introduction to stability and control.

MAE 3060 Spacecraft Engineering

Spring. 3 credits. Prerequisite: ENGRD 2030 or junior or senior MAE or ECE students or permission of instructor.

Introduction to spacecraft engineering from satellite design through launch to orbital operation. Topics include space missions, space environment, orbital mechanics, systems engineering, and satellite design. Most spacecraft subsystems are introduced including rocket theory, attitude determination and control, thermal design, and communications. Earth-orbiting and interplanetary satellites are considered. Discussions of current problems and trends in spacecraft operation and development.

MAE 3120 Mechanical Properties of Materials, Processing, and Design (also MSE 4020, 5820)

Fall. 4 credits.

For description, see MSE 4020.

MAE 3130 Atomic and Molecular Structure of Matter (also MSE 2060, 5810)

Spring. 4 credits.

For description, see MSE 2060.

MAE 3230 Introductory Fluid Mechanics

Fall; usually offered in summer through Engineering Cooperative Program. 4 credits. Limited to ME majors and those officially registered for AE or ME minor. Prerequisites: ENGRD 2020 and ENGRD 2030 and pre- or co-registration in ENGRD 2210, or permission of instructor.

Topics include physical properties of fluids, hydrostatics, conservation laws using control volume analysis and using differential analysis, Bernoulli's equation, potential flows, simple viscous flows (solved with Navier-Stokes equations), dimensional analysis, pipe flows, boundary layers. Introduction to compressible flow.

MAE 3240 Heat Transfer

Spring; usually offered in summer through Engineering Cooperative Program. 3 credits. Prerequisite: MAE 3230 or permission of instructor.

Topics include discussion of steady and unsteady heat conduction; forced and free convection; external and internal flows; radiation heat exchange; and heat exchangers and boiling.

MAE 3250 Analysis of Mechanical and Aerospace Structures

Fall; usually offered in summer through Engineering Cooperative Program. 3 credits. Prerequisites: ENGRD 2020 and MAE 2120.

Topics in mechanics of materials applied to analysis and design of structural components encountered in mechanical and aerospace systems, including multiaxial stress states,

statically indeterminate structures, torsion and bending of nonsymmetric or curved members, stability, and stress concentrations. Solution strategies include both analytical and finite element methods.

MAE 3260 System Dynamics

Spring; usually offered in summer through Engineering Cooperative Program. 4 credits. Prerequisite: MATH 2930, MATH 2940, ENGRD 2030; junior standing.

Dynamic behavior of mechanical systems: modeling, analysis techniques, and applications; vibrations of single- and multi-degree-of-freedom systems; feedback control systems. Computer simulation and experimental studies of vibration and control systems.

MAE 3272 Mechanical Property and Performance Laboratory

Spring. 2 credits. Prerequisites: MAE 2120, 3250.

This course provides an introduction to the experimental methods, instrumentation, and data analyses associated with material property determination and mechanical performance of materials. Emphasis is placed on integration of theory and analysis with experimental methods.

MAE 3780 Mechatronics

Fall. 3 credits. Prerequisite: MATH 2930, PHYS 2213, or permission of instructor.

At the intersection of mechanical and electrical engineering, Mechatronics involves technologies necessary to create automated systems. This course introduces students to the functional elements of modern controlled dynamic systems. Topics include analog circuits (both passive and active components); filter design; diodes; transistors, MOSFETs and power amplification; pulse width modulation; transduction; mechanical and electro-mechanical devices such as electromagnetic systems; piezoelectric and shape memory material transduction; gear trains; optical encoders; discretization; aliasing; and microprocessors and programming. Lab experiments culminate in the design, fabrication, and programming of a microprocessor-controlled robotic vehicle, which laboratory groups enter into a class-wide competition.

MAE 4000 Components and Systems: Engineering in a Social Context (also STS 4001)

Fall. 3 credits. Prerequisites: upper-class standing, two years of college physics. Counts as "Senior Design Elective" if students sign up for corresponding section of MAE 4291. Co-meets with MAE 5000. Offered alternate years.

Addresses, at a technical level, broader questions than are normally posed in the traditional engineering or physics curriculum. Through the study of individual cases such as the Strategic Defense Initiative (SDI), the National Missile Defense, supersonic transport, and the automobile and its effect on the environment, the course investigates interactions between the scientific, technical, political, economic, and social forces that are involved in the development of engineering systems.

MAE 4020 Wind Power

Fall. 3 credits. Prerequisite(s): MAE 3230 (or equivalent) or MAE 3050, MAE 3250. Counts as "Senior Design Elective" if M.E. seniors enroll in corresponding section of MAE 4291.

Main features of energy conversion by wind turbines. Emphasis on characterization of the atmospheric boundary layer, aerodynamics of horizontal axis wind turbines, and performance prediction. Structural effects, power train considerations, siting, and wind farm planning.

[MAE 4040 Materials Selection for Clean Mechanical Designs

Spring. 3 credits. Prerequisites: MAE 2120, MAE 3250. Pre- or corequisite MAE 3272. Counts as "Senior Design Elective" for M.E. students who enroll in corresponding section of MAE 4291. Offered alternate years; next offered 2010-2011.

Advanced material selection concepts, which build off of the fundamentals of materials index developed in MAE 2120 and 3250, including process and shape selection, hybrid materials, and industrial design. Includes a brief overview of current clean technologies and the basics of life cycle and environmentally conscious design. Two main themes are: (1) application of materials-selection basics and concepts of life-cycle design to current design limitations associated with various clean technologies and (2) determination of the mechanical properties of various emerging green materials.]

MAE 4140 Mechanics of Lightweight Vehicles

Fall. 3 credits. Prerequisites: MAE 2120, 3250, and 3272 or equivalent; senior standing in MAE. "Senior Design Elective" for M.E. students who enroll in corresponding section of MAE 4291. Offered alternate years.

Covers fundamentals of vehicle mechanics for several classes of vehicles (bicycles, light cars, airframes). Topics include types of vehicle structures; pertinent aspects of mechanical behavior including elastic and inelastic responses; static and dynamic behavior of vehicles under elastic loading; and mechanics of crashworthiness. Lectures cover essential background material for understanding of vehicle mechanics. Labs provide hands-on experiences in the major components of the course.

MAE 4150 GPS: Theory and Design (also ECE 4150)

Fall. 4 credits. Prerequisites: 3000-level engineering course with advanced math content (e.g., ECE 3030 or MAE 3260).

For description, see ECE 4150.

MAE 4170 Introduction to Robotics: Dynamics, Control, Design

Spring. 3 credits. Prerequisites: engineering math at level of MATH 2930 and MATH 2940 (Engineering Mathematics); some course in dynamics at level of TAM/ENGRD 2030 (Dynamics); familiarity with control concepts typical of MAE 3260 (System Dynamics).

Introductory course in the analysis and control of mechanical manipulators and related robotic machines. Topics include spatial descriptions and transformations, manipulator kinematics and inverse kinematics. Design of end effectors, differential relationships and static forces, manipulator dynamics, trajectory generation, sensors and actuators. Design of PD controllers, trajectory control, and compliant motion control. Simulation and design using MATLAB and multi-body codes are used. Co-meets with MAE 5170.

MAE 4230 Intermediate Fluid Dynamics
Spring, 3 credits. Prerequisite: MAE 3230 (Introductory Fluid Mechanics) or CEE 3310/BEE 3310, CHEME 3230 or permission of instructor. Counts as "Senior Design Elective" if M.E. seniors enroll in the corresponding section of MAE 4291.
Co-meets with MAE 5230.

This course builds on the foundation of MAE 3230. Emphasis is placed on both the fundamental principles and numerical calculation of real flows (both engineering and environmental) using a computational fluid dynamics package. Topics include compressible flow, exact solutions to the Navier-Stokes equations, boundary layers, wakes and jets, separation, convection, fluid instabilities, and turbulence.

MAE 4250 FSAE Automotive Design Project

Fall, spring. Usually 3 credits: 3 for team members or 4 for team leaders.

Prerequisite: Engineering juniors and seniors or permission of instructor. Counts as "Senior Design Elective" if M.E. seniors enroll in corresponding section of MAE 4291.

Project course to research, design, build, develop, and compete with a Formula SAE car for intercollegiate competition. Students work in interdisciplinary teams using concurrent engineering and systems engineering principles applied to complex mechanical, electromechanical, and electronic systems.

MAE 4272 Fluids/Heat Transfer Laboratory

Fall, 3 credits. Fulfills technical-writing requirement. Prerequisites: MAE 3230, 3240.

Laboratory exercises in fluid mechanics and the thermal sciences. Measurements of flame temperature, pressure, heat transfer, viscosity, lift and drag, fluid-flow rate, effects of turbulence, airfoil stall, flow visualization, and spark ignition engine performance. Instrumentation, techniques and analysis, and interpretation of results. Biweekly written assignments with extensive feedback.

MAE 4291 Supervised Senior Design Experience

Fall, spring. Minimum of 1 or 3 credits depending on section chosen. Prerequisite: senior standing or permission of instructor; taken concurrently or after MAE 4280.
Letter grades only.

Substantial design experience based on the knowledge and skills acquired in earlier course work and incorporating engineering standards and realistic constraints. Sections of this course satisfy the BS ME senior design requirement. They are offered in conjunction with a course designated as "Senior Design Elective" (MAE 4000, 4020, 4040, 4140, 4230, 4700, 4860) or are directed by a faculty member as an individual or a team design exercise. Consult www.mae.cornell.edu for enrollment details.

MAE 4300 Professional Practice in Mechanical Engineering

Fall, 2 credits. Prerequisite: senior standing in MAE or permission of instructor. This course is required for M.E. seniors, replacing MAE 4280.

Professional practice and broader impacts of the mechanical engineering profession are presented through a series of lectures and invited talks, supplemented by assignments and projects. Topics include professional ethics, product liability, intellectual property,

career/educational paths, contemporary issues facing mechanical engineers, and engineering successes and failures, along with the global, societal, environmental and/or economic aspects and impact of engineering.

MAE 4320 MicroElectro Mechanical Systems (MEMS) (also ECE 4320)

Fall, 4 credits. Prerequisite: ECE 3150, AEP 3630, or MAE 3780 or permission of instructor.

For description, see ECE 4320

[MAE 4490 Combustion Engines and Fuel Cells

Spring, 3 credits. Prerequisites: ENGRD 2210 and MAE 3230. Offered alternate years; next offered 2010–2011.

Introduction to reciprocating combustion engines and fuel cells, with emphasis on the application of thermodynamic and fluid-dynamic principles affecting their performance. Chemical equilibrium and kinetics, electrochemistry, thermodynamic limits on performance, deviations from ideal processes, engine breathing, combustion, knock. Formation and control of undesirable exhaust emissions.]

MAE 4530 Computer-Aided Engineering: Applications to Biomedical Processes (also BEE 4530)

Spring, 3 credits. Fulfills technical elective requirement for MAE students. Prerequisite: Heat and Mass Transfer (BEE 3500 Biological and Environmental Transport Processes, or CHEME 3240 Heat and Mass Transfer, or MAE 3240 Heat Transfer) or equivalent.

For description, see BEE 4530.

MAE 4550 Introduction to Composite Materials (also CEE 4770, MSE 5550, TAM 4550)

Fall, 4 credits.

For description, see TAM 4550.

MAE 4570 Space Systems and National Security

Fall, 3 credits. Prerequisite: upper-level standing and MATH 2930 and ENGRD 2030 or permission of instructor.

This course is intended to provide an overview of the implications of space for national security and vice versa. It will consider subjects such as an overview of United States space usage, how the United States monitors what is in space, specific national security applications of space systems, vulnerabilities of space systems, anti-satellite and space weapons, the relationship between missile defenses and space weapons, and the current debate over how the United States can best preserve the benefits it receives from the use of space.

MAE 4580 Introduction to Nuclear Science and Engineering (also ECE/TAM 4130)

Fall, 3 credits. Prerequisites: PHYS 2214 and MATH 2940.

For description, see TAM 4130.

MAE 4590 Introduction to Controlled Fusion: Principles and Technology (also AEP/ECE/NSE 4840)

Spring, 3 credits. Prerequisites: PHYS 1112, 2213, and 2214, or equivalent background in electricity and magnetism and mechanics. Intended for seniors and graduate students in engineering and the physical sciences. Offered alternate years.

For description, see ECE 4840.

MAE 4610 Entrepreneurship for Engineers (also ENGRG 4610, ORIE 4152)

Fall, 3 credits. Limited enrollment. Prerequisite: upper-level engineers or permission of instructor.

Develops skills necessary to identify, evaluate, and begin new business ventures. Topics include intellectual property, competition, strategy, business plans, technology forecasting, finance and accounting, and sources of capital. A rigorous, quantitative approach is stressed throughout, and students create financial documents and plans, analyze human resource models, and work with sophisticated valuation methods, complicated equity structures, and legal and business documents. As such, this course represents the "red meat" of entrepreneurship, and the soft skills are left for other courses. Course work consists of discussions, assignments, and the preparation and presentation of a complete business plan.

[MAE 4640 Orthopaedic Tissue Mechanics (also BME 4640)

Spring, 3 credits. Prerequisites: ENGRD 2020 Mechanics of Solids and MAE 3250 Mechanical Design and Analysis or permission of instructor. Co-meets with MAE 5640. Offered alternate years; next offered 2010–2011.

Applications of mechanics and materials principles to orthopaedic tissues. Physiology of bone, cartilage, ligament, and tendon and how these properties relate to mechanical function. Mechanical behavior of skeletal tissues in the laboratory. Functional adaptation of these tissues to their mechanical environment. Tissue engineering of replacement structures.]

MAE 4660 Biomedical Engineering Analysis of Metabolic and Structural Systems (also BME 4010)

Fall, 3 credits. Prerequisites: ENGRD 2020 Mechanics of Solids and previous course work in biology or permission of instructor.

For description, see BME 4010.

MAE 4700 Finite Element Analysis for Mechanical and Aerospace Design

Fall, 3 credits. Fulfills senior design requirement for MAE students. Limited enrollment. Prerequisite: senior standing or permission of instructor. Evening exams. Term project. "Counts as Senior Design Elective" if M.E. seniors enroll in corresponding section of MAE 4291.
Co-meets with MAE 5700.

Introduction to linear finite element static and dynamic analysis for discrete and distributed mechanical and aerospace structures. Prediction of load, deflection, stress, strain, and temperature distributions. Major emphasis on underlying mechanics and numerical methods. Introduction to computational aspects via educational and commercial software (such as MATLAB and ANSYS). Selected mechanical and aerospace applications in the areas of trusses, beams, frames, heat transfer (steady state and transient), and elasticity (static and dynamic).

MAE 4770 Engineering Vibrations

Spring, 3 credits. Pre- or corequisite: MAE 3260 or permission of instructor. Co-meets with MAE 5770.

Lumped element, distributed parameter, and mixed structural vibratory systems are examined. Equations of motion are derived

from Newton's law and Lagrange's equations. Eigenanalysis, free and forced responses, and frequency/time domain solutions are considered. Vibration absorbers, isolators, and vibration suppression control systems using feedback approaches also are investigated.

MAE 4780 Feedback Control Systems (also CHEME/ECE 4720)

Fall. 4 credits. Prerequisites: CHEME 3720 or MAE 3260 or permission of instructor. Co-meets with MAE 5780.

Analysis techniques, performance specifications, and analog-feedback-compensation methods for single-input, single-output, linear, time-invariant systems. Laplace transforms and transfer functions are the principal mathematical tools. Design techniques include root-locus and frequency response methods. Includes laboratory that examines modeling and control of representative dynamic processes.

MAE 4860 Automotive Engineering

Spring. 3 credits. Prerequisites: ENGRD 2020 or permission of instructor. Counts as "Senior Design Elective" if M.E. seniors enroll in corresponding section of MAE 4291.

Selected topics in the analysis and design of vehicle components and vehicle systems. Emphasis on automobiles. Engines, transmissions, suspension, brakes, and aerodynamics will be discussed. The course uses first principles and applies them to specific systems. The course is highly quantitative, using empirical and analytical approaches.

MAE 4900 Special Investigations in Mechanical and Aerospace Engineering

Fall, spring. 4 variable credits. Prerequisite: undergraduate standing and permission of instructor.

Intended for an individual student or a small group of students who want to pursue a particular analytical or experimental investigation outside of regular courses or for informal instruction supplementing that given in regular courses.

MAE 4980 Teaching Experience in Mechanical Engineering

Fall, spring. 3 variable credits. Prerequisite: permission of instructor. Cannot be used to fulfill M.E. technical elective or M.E. major elective requirements but may be approved as advisor-approved elective. May not be used toward satisfying M.E. minor.

Students serve as teaching assistants in Cornell mechanical engineering classes or in local middle school technology classes.

MAE 5000 Components and Systems: Engineering in a Social Context

Fall. 3 credits. Prerequisites: graduate standing or permission of instructor, two years of college physics. Co-meets with MAE 4000. Offered alternate years.

For description, see MAE 4000.

MAE 5010 Future Energy Systems

Spring. 3 credits. Prerequisites: ENGRD 2210 Thermodynamics or equivalent. Recommended: MAE 3230 Introductory Fluid Mechanics, MAE 3240 Heat Transfer, or equivalents; graduate or senior standing or permission of instructor.

Critically examines the technology of energy systems that will be acceptable in a world faced with global climate change, local pollution, and declining supplies of oil. The

focus is on renewable energy sources (wind, solar, biomass), but other non-carbon-emitting sources (nuclear) and lowered-carbon sources (co-generative gas turbine plants, fuel cells) also are studied. Both the devices and the overall systems are analyzed.

MAE 5060 Aerospace Propulsion Systems

Spring. 3 credits. Prerequisite: MAE 3050 Introduction to Aeronautics or permission of instructor. Offered alternate years.

Application of thermodynamic and fluid-mechanical principles to design and performance analysis of aerospace propulsion systems. Jet propulsion principles, including gas turbine engines and rockets. Electric propulsion. Future possibilities for improved performance of aerospace propulsion systems.

[MAE 5070 Dynamics of Flight Vehicles

Spring. 3 credits. Prerequisite: MAE 3050 Introduction to Aeronautics. Pre- or co-requisite: MAE 3260 System Dynamics or permission of instructor. Offered alternate years; next offered 2010-2011.

Introduction to stability and control of atmospheric-flight vehicles. Review of aerodynamic forces and methods for analysis of linear systems. Static stability and control. Small disturbance equations of unsteady motion. Dynamic stability of longitudinal and lateral-directional motions; transient response. At the level of *Flight: Stability and Automatic Control* by Nelson.]

[MAE 5130 Mechanical Properties of Thin Films (also MSE 5120)

Spring. 3 credits. Offered alternate years; next offered 2010-2011.

For description, see MSE 5120.]

MAE 5170 Introduction to Robotics: Dynamics, Control, Design

Spring. 3 credits. Graduate version of MAE 4170. Co-meets with MAE 4170.

For description, see MAE 4170.

MAE 5200 Dimensional Tolerancing in Mechanical Design

Fall, seven-week half term. 2 credits. Prerequisites: MAE 2250 or equivalent CAD-based design course, plus 2.5 years of engineering mathematics through probability and statistics.

Designers use dimensional tolerances to limit spatial variations in mechanical parts and assemblies; the primary goals are interchangeability in assembly, performance, and cost. This course covers traditional limit tolerances briefly but focuses mainly on modern geometric tolerances and their role in assembly control. Students learn how to represent assemblies in terms of mating and relational constraints, and how to design tolerances and inspection procedures from part and assembly specifications.

MAE 5210 Theory of Linear Systems (also ECE 5210)

Fall. 3 credits. Prerequisite: ECE 3200, MAE 3260, or permission of instructor.

Recommended: good background in linear algebra and linear differential equations. State-space and multi-input-multi-output linear systems in discrete and continuous time. The state transition matrix, the matrix exponential, and the Cayley-Hamilton theorem. Controllability, observability, stability, realization theory. At the level of *Linear Systems* by Kailath.

MAE 5230 Intermediate Fluid Dynamics

Spring. 4 credits. Prerequisite: graduate standing or permission of instructor.

Co-meets with MAE 4230.

Intended for M.Eng. students who wish to take a fluid dynamics course including implementation of commercial computational fluid dynamics packages. Complements material in MAE 6010 and 6020. For description of topics covered, see MAE 4230. Includes a 1-credit CFD design project due at the end of the semester. Students desiring to write their own computational fluid dynamics software should consider one or more of MAE 6360, 7360, and 7370.

MAE 5240 Physics of Micro- and Nanoscale Fluid Mechanics (also CHEME 6240)

Fall. 3 credits. Prerequisite: undergraduate fluid or continuum mechanics (e.g., MAE 3230) or permission of instructor. Co-meets with MAE 6240.

Introduction to fluid mechanics in micro- and nanofabricated devices. Physicochemical hydrodynamics, electrokinetic effects, capillarity, continuum breakdown, micro- and nanofluidic applications in chemistry and life sciences.

MAE 5430 Combustion Processes

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor.

An introduction to combustion and flame processes, with emphasis on fundamental fluid dynamics, heat and mass transport, and reaction-kinetic processes that govern combustion rates. Topics include thermochemistry, kinetics, vessel explosions, laminar premixed and diffusion flames, and droplet combustion. Optional topics may include complex combustion systems, turbulent flames, fuel cells, or combustion of solids.

MAE 5459 Energy Seminar I (also ECE 5870)

Fall. 1 credit.

For description, see ECE 5870.

MAE 5469 Energy Seminar II (also ECE 5880)

Spring. 1 credit.

For description, see ECE 5880.

[MAE 5640 Orthopaedic Tissue Mechanics

Spring. 3 credits. Graduate version of MAE 4640. Offered alternate years; next offered 2010-2011.

For description see MAE 4640.]

MAE 5680 Soft Tissue Biomechanics

Fall. 3 credits.

For description, see BME 5810.

[MAE 5690 Clinical Biomechanics of Musculoskeletal Tissues (also BME 5690)

Fall or spring. 3 credits. Prerequisites: ENGRD 2020, MAE 2120, and MAE 3250, or permission of instructor. Offered alternate years; next offered 2010-2011.

Review physiology and biomechanics of musculoskeletal tissues, focusing on skeletal muscle, ligament, and tendon and the relationship between the structure and mechanical function. Apply mechanics of materials to evaluate and solve clinical problems of musculoskeletal tissue. Determine how the tissues adapt to injury and degenerative changes.]

MAE 5700 Finite Element Analysis for Mechanical and Aerospace Design

Fall. 4 credits. Prerequisite: graduate standing or permission of instructor. Evening exams. Term project. Graduate version of MAE 4700 requires additional programming assignment. Co-meets with MAE 4700.

For description, see MAE 4700.

[MAE 5710 Applied Dynamics]**MAE 5770 Engineering Vibrations**

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. Graduate version of MAE 4770. Co-meets with MAE 4770.

For description, see MAE 4770.

MAE 5780 Feedback Control Systems

Fall. 4 credits. Graduate version of MAE 4780. Co-meets with MAE 4780.

For description, see MAE 4780.

MAE 5900 Special Investigations in Mechanical and Aerospace Engineering

Fall, spring. Variable credit.

FSAE or Automotive XPrize team. For non-engineering graduate students.

MAE 5910 Applied Systems Engineering (also CEE 5240, CIS 5040, ECE 5120, ORIE 5140, SYSEN 5100)

Fall. 3 credits. Prerequisites: senior or graduate standing in engineering field; concurrent or recent (past two years) enrollment in a group-based project with a strong system design component that is approved by course instructor.

For description, see SYSEN 5100.

MAE 5920 System Architecture, Behavior, and Optimization (also CEE/CS 5050, ECE 5130, ORIE 5142, SYSEN 5200)

Spring. 3 credits. Prerequisites: senior or graduate standing and completion of Applied Systems Engineering 1 (CEE 5240, CS 5040, ECE 5120, ORIE 5140, MAE 5910, or SYSEN 5100) or permission of instructor.

For description, see SYSEN 5200.

MAE 5930 Systems Engineering for the Design and Operation of Reliable Systems (also SYSEN 5300)

Fall. 3 credits. Prerequisites: MAE 5910 and either ENGRD 2700 or CEE 3040.

For description, see SYSEN 5300.

MAE 5949 Enterprise Engineering Colloquium (also ORIE 9100-9101)

Fall, spring. 1 credit each semester. Usually S-U grades.

For description, see ORIE 9100-9101.

MAE 6010 Foundations of Fluid Dynamics and Aerodynamics

Fall. 4 credits. Prerequisite: graduate standing or permission of instructor.

Foundations of fluid mechanics from an advanced viewpoint, including formulation of continuum fluid dynamics; surface phenomena and boundary conditions at interfaces; fundamental kinematic descriptions of fluid flow, tensor analysis, derivation of the Navier-Stokes equations and energy equation for compressible fluids; and sound waves, viscous flows, boundary layers, and potential flows.

[MAE 6020 Fluid Dynamics at High Reynolds Numbers]**[MAE 6060 Spacecraft Dynamics and Mission Design]**

Spring. 3 credits. Prerequisites: graduate standing or permission of instructor; background in linear algebra at level of MATH 2940; some experience with MATLAB is expected. Offered alternate years. Next offered 2010-2011.

The focus is on spacecraft attitude dynamics and its application in core space-systems areas: mission design, operations, and autonomy. Also introduces the problem of attitude estimation and treats aspects of guidance, navigation, and control unique to the context of space mission design. Readings and lectures include examples based on flight data.]

[MAE 6080 Physics of Fluids]**MAE 6130 Finite Element Methods for Inelastic Design and Process Modeling**

Spring. 4 credits. Prerequisites: introductory finite element course, equivalent experience or permission of instructor. Offered alternate years.

Finite element methods provide powerful computations tools for analyzing the deformations of mechanical systems over a broad range of behaviors, both elastic and inelastic. Analyses of inelastic behaviors arise in the designs for aerospace, automotive, and power generation applications and in the simulation of a wide array of forming and joining processes. This course covers several aspects of inelastic finite element analyses, including: yield criteria and strain hardening laws for plasticity and creep, large deformation kinematics, strategies for solving nonlinear systems, and time integration methods. Applications are drawn from crashworthiness, thermomechanical ratcheting, and metal forming.

MAE 6150 Experiments in Materials Processing

Fall. 4 credits. Prerequisite: graduate standing.

In this lab-centered course, a general introduction to engineering instrumentation fundamentals is presented focusing primarily on experimental solid mechanics. Transducer design for the measurement of force, displacement, strain, and temperature is introduced along with the fundamentals of calibration, sensitivity, resolution, and error estimation. Techniques for determination of the mechanical response of engineering materials are developed. Applications include elastic plastic deformation, fracture, and fatigue.

MAE 6240 Physics of Micro- and Nanoscale Fluid Mechanics

Fall. 4 credits. Prerequisite: undergraduate fluid or continuum mechanics (e.g., MAE 3230) or permission of instructor. Co-meets with MAE 5240; includes additional 1-credit design project.

For description, see MAE 5240.

MAE 6270 Experimental Methods in Fluid Dynamics (also CEE 6370)

Spring. 4 credits. E. A. Cowen.

For description, see CEE 6370.

[MAE 6310 Turbulence and Turbulent Flows]**[MAE 6430 Computational Combustion]****[MAE 6450 Turbulent Reactive Flow]****[MAE 6480 Air Quality and Atmospheric Chemistry (also EAS 6480)]**

Fall. 3 credits. Prerequisites: first-year chemistry and thermodynamics (or equivalent); graduate standing or permission of instructor. Offered alternate years; next offered 2010-2011.

Factors determining air quality and effects of air pollutants on public health, ecological systems and global climate change. Students will examine the source-to-receptor relationship of major air pollutants with an emphasis on the physical and chemical fundamentals of atmospheric transport and transformation. Topics include photochemical smog, atmospheric aerosols, atmospheric transport and deposition, emissions from energy systems, introduction to air quality monitoring and modeling, and air quality management.]

[MAE 6500 Evolutionary Computation and Design Automation (also CS 7726)]**MAE 6510 Advanced Heat Transfer**

Fall, 4 credits. Prerequisite: graduate standing or permission of instructor.

An advanced treatment of conduction, convection, and radiation heat transfer from a theoretical perspective. Topics include: conservation of linear momentum in integral and differential forms; the transport theorem; steady state and transient conduction; moving boundary effects associated with melting and evaporation; boundary layer flows with emphasis on laminar conditions (including an introduction to turbulence); scale analysis; forced and free convection; internal and external flows; radiation, including black body and gray body radiation; and radiative transport equation. Taught at the level of *Conduction Heat Transfer*, by Arpaci; *Convective Heat and Mass Transfer*, by Kays et al.; and *Radiation Heat Transfer*, by Sparrow and Cess.

MAE 6550 Composite Materials (also TAM/MSE 6550)

Spring. 4 credits.

For description, see TAM 6550.

MAE 6560 Nanoscale Energy Transport and Conversion

Spring. 4 credits. Prerequisites: undergraduate heat transfer recommended (e.g., MAE 3240) or permission of instructor.

As electronic, optoelectronic, photonic, and fluidic devices shrink from the microscale down to the nanoscale, the mechanisms for transmitting heat, light, and energy become dramatically different. This course aims to provide a detailed look at thermal, electrical, and optical energy transport and conversion mechanisms at the nanoscale. Topics include a brief review of macroscopic heat transfer with emphasis on limits of macroscopic models, microscopic picture of energy carriers, material waves, energy quantization and energy states in solids, statistical thermodynamics and probability distribution functions as related to thermal energy storage, energy transport by waves and classical particle descriptions of transport processes and energy conversion and exchange processes between carriers.

[MAE 6640 Mechanics of Bone (also BME 6640)]

Spring, 3 credits. Prerequisite: graduate standing or permission of instructor. Offered alternate years; next offered 2010-2011.

Covers current methods and results in skeletal research, focusing on bone. Topics include skeletal anatomy and physiology, experimental and analytical methods for determination of skeletal behavior, mechanical behavior of bone tissue, and skeletal functional adaptation to mechanics.]

[MAE 6650 Principles of Tissue Engineering (also BME/MSE 6650)]

Spring, 3 credits. Prerequisite: graduate standing or permission of instructor. Next offered 2010-2011. L. Bonassar.

For description, see BME 6650.]

[MAE 6740 Hybrid Systems]

Spring, 4 credits. Prerequisite: MAE 5210 Linear Systems or permission of instructor. Offered alternate years; next offered 2010-2011.

Introduction to the theory and application of hybrid systems, systems that have both discrete and continuous dynamics. The first part of the course will address general topics such as modeling, control, simulation, verification, and application of hybrid system theory. The second part will focus on new and emerging topics.]

[MAE 6750 System Identification and Control]**MAE 6760 Model-Based Estimation**

Fall, 4 credits. Prerequisites: linear algebra, differential equations, and MATLAB programming; M.S./Ph.D. students or permission of instructor. Offered alternate years.

Covers a variety of ways in which models and experimental data can be used to estimate model quantities that are not directly measured. The two main estimation methods that are presented are least-squares estimation for general problems and Kalman filtering for dynamic systems problems. Techniques for linear models are taught as are techniques for nonlinear models. Both theory and application are presented.

MAE 6770 Robust Control

Fall, 4 credits Prerequisites: ECE/CHEM 4720, ECE/MAE 5210, or MAE 4780/5780, or equivalent or permission of instructor. Offered alternate years.

An introduction to the analysis and control of uncertain systems. First, the course will discuss H-2 and H-infinity control theories and their restatement as semi-definite programming problems. The latter half of the course will consist of the following topics: multiplier theory, switched control, gain-scheduling, and linear Markovian jump systems. Homework involves both analytical exercises and numerical exercises performed with linear matrix inequality solvers.

MAE 6780 Multivariable Control Theory

Spring, 4 credits. Prerequisites: MAE 4780 or 5780 or ECE 4720 Feedback Control Systems and MAE 5210 Theory of Linear Systems, or permission of instructor; strong background in classical control, linear algebra, and state space models.

Introduction to multivariable feedback control theory in both time and frequency domain. Primary topics include state space methods, model-based compensators, performance and robustness of multivariable systems, model

reduction, Linear Quadratic and H-infinity optimal control, and random processes and Kalman filtering for control. Additional topics at the discretion of the instructor include uncertainty management and robust control, discrete time control, optimal control, and nonlinear control.

MAE 6900 Special Investigations in Mechanical and Aerospace Engineering

Fall, spring. Variable credit. Prerequisite: candidacy for M.Eng. degree in mechanical or aerospace engineering or approval of faculty member offering project.

Project-based course in the area of mechanical or aerospace engineering under the guidance of a faculty member.

MAE 6950 Special Topics in Mechanical and Aerospace Engineering

Fall, spring. Credit TBA. Prerequisites: graduate standing and permission of instructor.

Special lectures by faculty members on topics of current research.

[MAE 7110 X-Ray Diffraction Methods for Engineering Materials]

Fall, 4 credits. Prerequisite: graduate standing or permission of instructor. Next offered 2010-2011.

We develop a general understanding of diffraction methods employed for understanding the state of crystalline materials. The focus will be on x-ray diffraction and the determination of crystal orientation and lattice strains. We conduct diffraction experiments at the CCMR x-ray facility and examine synchrotron x-ray data. We develop MATLAB-based methods for reducing diffraction data and extracting distributions of orientation and lattice strain.]

[MAE 7120 Mechanics of Materials with Oriented Microstructures]

Spring, 4 credits. Prerequisite: TAM 6630 or equivalents. Offered alternate years; next offered 2010-2011.

The focus of this course is the evaluation of mechanical properties from knowledge of the material microstructure, with attention to anisotropic elastic and plastic behaviors. Topics include mathematical and mechanics preliminaries; mathematical foundations of orientations, including parameterizations, symmetries, and fibers; construction and sampling of orientation distributions; hypotheses used to link macro and micro length scales; methods for evaluation of effective elastic and plastic moduli; evolution of orientations and orientation distributions with deformation. Applications to polycrystalline solids (metal alloys and minerals), composite materials, biomaterials (soft tissues), and polymers.]

[MAE 7140 Computational Sensorics: Information Technologies for Complex Continuum Systems]**MAE 7150 Atomistic Modeling of Materials**

Spring, 4 credits. Prerequisite: graduate standing or permission of instructor.

Intended for graduate students in engineering, physics, and chemistry with interests in the simulation of materials at the atomic scale using academic and commercial software. Emphasis is given to models of interatomic forces from Lennard-Jones models to self-consistent all-electron solution of the quantum mechanical problem. Specific topics include energy models, density functional theory and

the total-energy pseudopotential method, Monte Carlo and molecular dynamics simulations, free energy and phase transitions, fluctuations and transport properties, first-principles MD, Ab-initio thermodynamics and structure prediction, coarse-graining methods and mesoscale models. The course includes advanced applications of materials to nanotechnology. The material covered is self-contained, but an earlier exposure to quantum mechanics and solid state physics is desirable.

MAE 7340 Analysis of Turbulent Flows

Spring, 4 credits. Prerequisite: MAE 6010 Foundations of Fluid Dynamics and Aerodynamics or permission of instructor. Offered alternate years.

Study of methods for calculating the properties of turbulent flows. Characteristics of turbulent flows. Direct numerical simulations and the closure problem. Reynolds-stress equation: effects of dissipation, anisotropy, deformation. Transported scalars. Probability density functions (pdfs): transport equations, relationship to second-order closures, stochastic modeling, and the Langevin equation. Large-eddy simulations: filtered and residual motions, Smagorinsky, and dynamic models. This course emphasizes comparison of theory with experiment and includes CFD projects.

[MAE 7370 Computational Fluid Mechanics and Heat Transfer]

Fall, 4 credits. Prerequisites: graduate standing; advanced course in continuum mechanics, heat transfer, or fluid mechanics; and some MATLAB, C++, or other programming experience. Next offered 2010-2011.

Numerical methods are developed for the elliptic and parabolic partial differential equations that arise in fluid flow and heat transfer when convection and diffusion are present. Finite-difference, finite-volume, and some spectral methods are considered, together with issues of accuracy, stability, convergence, and conservation. Current methods are reviewed. Emphasis is on steady and unsteady essentially incompressible flows. Assigned problems are solved on a digital computer.]

MAE 7910 Mechanical and Aerospace Research Conference

Fall, spring, 1 credit each semester. For graduate students involved in research projects. S-U grades only.

Presentations on research in progress by faculty and students.

MAE 7999 Mechanical and Aerospace Engineering Colloquium

Fall, spring, 1 credit each semester; credit limited to graduate students. All students and staff are invited to attend.

Lectures by visiting scientists and Cornell faculty and staff members on research topics of current interest in mechanical and aerospace science, especially in connection with new research.

MAE 8900 Research in Mechanical and Aerospace Engineering

Credit TBA. Prerequisite: candidacy for M.S. degree in mechanical or aerospace engineering or approval from director.

Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the faculty.

MAE 9900 Research in Mechanical and Aerospace Engineering

Credit TBA. Prerequisite: candidacy for Ph.D. degree in mechanical or aerospace engineering or approval from director. Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the faculty.

NUCLEAR SCIENCE AND ENGINEERING

Faculty members in the graduate field of nuclear science and engineering who are most directly concerned with the curriculum include K. B. Cady, D. A. Hammer, R. W. Kay, and V. O. Kostroun.

NSE 4130 Introduction to Nuclear Science and Engineering (also AEP/CHEME/ECE/TAM 4130, MAE 4580)

Fall. 3 credits. Prerequisites: PHYS 2214 and MATH 2940.
For description, see TAM 4130.

NSE 4140 Nuclear Reactor Physics (also TAM 4140)

For description, see TAM 4140.

NSE 4840 Introduction to Controlled Fusion: Principles and Technology (also AEP/ECE 4840, MAE 4590)

Spring. 3 credits. Prerequisites: PHYS 1112, 2213, and 2214, or equivalent background in electricity and magnetism and mechanics; and permission of instructor. Intended for seniors and graduate students. D. A. Hammer.
For description, see ECE 4840.

NSE 5450 Energy Seminar (also ECE 5870, MAE 5450)

Fall, spring. 1 credit; may be taken for credit both semesters. D. A. Hammer.
For description, see ECE 5870.

NSE 5900 Independent Study

Fall, spring. 1–4 credits. S–U or letter grades. Staff.
Independent study or project under guidance of a faculty member.

NSE 5910 Project

Fall, spring. 1–6 credits. Staff.
Master of engineering or other project under guidance of a faculty member.

NSE 6330 Nuclear Reactor Engineering (also AEP 6330)

Fall. 4 credits. Prerequisite: introductory course in nuclear engineering. Offered on demand. K. B. Cady.
The fundamentals of nuclear reactor engineering, reactor siting and safety, fluid flow and heat transfer, control, environmental effects, and radiation protection.

OPERATIONS RESEARCH AND INFORMATION ENGINEERING

L. J. Billera, R. G. Bland, K. Caggiano, J. R. Callister, E. Friedman, S. Henderson, P. L. Jackson, R. A. Jarrow, A. Lewis, M. Lewis, W. L. Maxwell, J. A. Muckstadt, N. Prabhu, P. Protter, J. Renegar, S. I. Resnick, D. Ruppert, P. Rusmevichientong, G. Samorodnitsky, D. Shmoys, É. Tardos, M. J. Todd, H. Topaloglu, L. E. Trotter, Jr., B. W. Turnbull, D. P. Williamson, D. B. Woodard

ORIE 3120 Industrial Data and Systems Analysis

Spring. 4 credits. Prerequisite: ENGRD 2700.

Database and statistical techniques for data mining, graphical display, and predictive analysis in the context of industrial systems (manufacturing and distribution). Database techniques include structured query language (SQL), procedural event-based programming (Visual Basic), and geographical information systems. Statistical techniques include multiple linear regression, classification, logistic regression, and time series forecasting. Industrial systems analysis includes factory scheduling and simulation, materials planning, cost estimation, inventory planning, and quality engineering.

ORIE 3150 Financial and Managerial Accounting

Fall, spring, summer, and winter. 4 credits. Covers principles of accounting, financial reports, financial-transactions analysis, financial-statement analysis, budgeting, job-order and process-cost systems, standard costing and variance analysis, and economic analysis of short-term decisions.

ORIE 3300 Optimization I

Fall and summer. 4 credits. Prerequisite: grade of C– or better in MATH 2210 or 2940.

Formulation of linear programming problems and solutions by the simplex method. Related topics such as sensitivity analysis, duality, and network programming. Applications include such models as resource allocation and production planning. Introduction to interior-point methods for linear programming.

ORIE 3310 Optimization II

Spring and summer. 4 credits. Prerequisite: grade of C– or better in ORIE 3300 or permission of the instructor.

A variety of optimization methods stressing extensions of linear programming and its applications but also including topics drawn from integer programming, dynamic programming, and network optimization. Formulation and modeling are stressed as well as numerous applications.

ORIE 3500 Engineering Probability and Statistics II

Fall and summer. 4 credits. Prerequisite: grade of C– or better in ENGRD 2700 or equivalent.

A rigorous foundation in theory combined with the methods for modeling, analyzing, and controlling randomness in engineering problems. Probabilistic ideas are used to construct models for engineering problems, and statistical methods are used to test and estimate parameters for these models. Specific topics include random variables, probability distributions, density functions, expectation and variance, multidimensional random variables, and important distributions

including normal, Poisson, exponential, hypothesis testing, confidence intervals, and point estimation using maximum likelihood and the method of moments.

ORIE 3510 Introductory Engineering Stochastic Processes I

Spring and summer. 4 credits. Prerequisite: grade of C– or better in ORIE 3500 or equivalent.

Uses basic concepts and techniques of random processes to construct models for a variety of problems of practical interest. Topics include the Poisson process, Markov chains, renewal theory, models for queuing, and reliability.

ORIE 3800 Information Systems and Analysis

Spring. 4 credits.

A systematic and hierarchical approach to the development of information systems, featuring business case justification, requirements analysis, use case analysis, functional analysis, structural design, object-oriented modeling, database design, verification and validation, and project schedule estimation. Graphical tools of analysis (e.g., the Unified Modeling Language) are emphasized. Examples are drawn from business and industrial processes. An integrative design project resulting in a detailed information system design specification (but not necessarily implementation) is required.

ORIE 4150 Economic Analysis of Engineering Systems

Spring. 4 credits. Prerequisites: ORIE 3300 and 3150.

Topics include financial planning, including cash-flow analysis and inventory flow models; engineering economic analysis, including discounted cash flows and taxation effects; application of optimization techniques, as in equipment replacement or capacity expansion models, and issues in designing manufacturing systems. Includes a student group project.

ORIE 4152 Entrepreneurship for Engineers (also MAE/ENGRG 4610)

Fall. 3 credits. Prerequisite: upper-level engineers or permission of instructor.
For description see MAE 4610.

ORIE 4154 Revenue Management

Fall. 3 credits. Prerequisites: ORIE 3300 and 3500, or permission of instructor.

The course covers pricing, capacity control, and assortment offering problems. Both static approximations and dynamic programming formulations are emphasized. The optimality of protection-level and bid-price policies in limited settings is illustrated, and these policies are used to find good solutions in more general settings. A structured framework for overbooking decisions is presented. Examples from a variety of industries, such as airline, hospitality, restaurant, and broadcasting, are used to illustrate the concepts.

[ORIE 4300 Optimization Modeling

Spring. 3 credits. Prerequisite: at least B– in ORIE 3310/5310. Next offered 2010–2011.

Emphasizes modeling complicated decision problems as linear programs, integer programs, or highly structured nonlinear programs. Besides modeling, students are required to assimilate articles from the professional literature and to master relevant software.]

[ORIE 4320 Nonlinear Optimization]

Fall. 4 credits. Prerequisite: ORIE 3300.
Next offered 2010–2011.

Introduction to the practical and theoretical aspects of nonlinear optimization. Gives attention to the computational efficiency of algorithms and the application of nonlinear techniques to linear programming, e.g., interior-point methods. Introduces methods of numerical linear algebra as needed.]

[ORIE 4330 Discrete Models]

Fall. 4 credits. Prerequisites: ORIE 3300 and CS 2110 or permission of instructor.
Next offered 2011–2012.

Covers basic concepts of graphs, networks, and discrete optimization. Fundamental models and applications, and algorithmic techniques for their analysis. Specific optimization models studied include flows in networks, the traveling salesman problem, and network design.]

[ORIE 4350 Introduction to Game Theory]

Spring. 4 credits. Prerequisite: ORIE 3300.

Broad survey of the mathematical theory of games, including such topics as two-person matrix and bimatrix games; cooperative and noncooperative n-person games; and games in extensive, normal, and characteristic function form. Economic market games. Applications to weighted voting and cost allocation.

[ORIE 4360 A Mathematical Examination of Fair Representation]

Spring. 3 credits. Prerequisite: MATH 2210 or 2940 or permission of instructor. Next offered 2011–2012.

Covers the mathematical aspects of the political problem of fair apportionment. The most recognizable form (in the United States) of apportionment is the determination of the number of seats in the U.S. House of Representatives awarded to each state. The constitution indicates that the apportionment should reflect the relative populations, but it does not prescribe a specific method. Indivisibility of seats leads us to interesting mathematical questions and a long, rich, and famous political history involving many famous figures. The basic ideas extend beyond apportionment of legislatures (in both federal systems and proportional representation systems) to other realms where indivisible resources are to be allocated among competing constituencies.]

[ORIE 4370 Computational Optimization]

Spring. 4 credits. Prerequisite: ORIE 3300.
Corequisite: ORIE 3310. Next offered 2010–2011.

Covers computational implementation and related methodology for solving large-scale, real-world integer programming problems. Primary emphasis is on branch-and-cut technology: pre-processing, cut strength, exact and heuristic separation techniques, branching strategies, multi-processing. Hands-on experience with state-of-the-art software for various discrete optimization models, including the traveling salesman, capacitated vehicle routing, and air crew scheduling models; experimentation with massively parallel computational implementation on the IBM BlueGene computer for the largest feasible subsystem problem.]

[ORIE 4520 Introductory Engineering Stochastic Processes II]

Spring. 4 credits. Prerequisite: ORIE 3510 or equivalent. Next offered 2010–2011.

Topics include stationary processes, martingales, random walks, and gambler's ruin

problems, processes with stationary independent increments, Brownian motion and other cases, branching processes, renewal and Markov-renewal processes, reliability theory, Markov decision processes, optimal stopping, statistical inference from stochastic models, and stochastic comparison methods for probability models. Applications to population growth, spread of epidemics, and other models.]

[ORIE 4540 Extreme Value Analysis with Applications to Finance and Data Communications]

Spring. 3 credits. Prerequisites: undergraduate and M.Eng. students; stochastic processes course at level of ORIE 3510; statistics course. Next offered 2010–2011.

Covers the basic models of extreme events used in hydrology, finance, insurance, environmental science (pollution controls), reliability, risk management. The course material intersects the related field of heavy tailed modeling and the implications of heavy tails in insurance and data networks.]

[ORIE 4580 Simulation Modeling and Analysis]

Fall. 4 credits. Prerequisite: ORIE 3500 (may be taken concurrently) and CS/ENGRD 2110.

Introduction to Monte Carlo simulation and discrete-event simulation. Emphasizes tools and techniques needed in practice. Random variate, vector, and process generation modeling using a discrete-event simulation language, input and output analysis, modeling.

[ORIE 4600 Introduction to Financial Engineering]

Fall. 3 credits. Prerequisites: ORIE 3500 and 3510. Next offered 2010–2011.

This is an introduction to the most important notions and ideas in modern financial engineering, such as arbitrage, pricing, derivatives, options, interest rate models, risk measures, equivalent martingale measures, complete and incomplete markets, etc. Most of the time the course deals with discrete time models. This course can serve as a preparation for a course on continuous time financial models such as ORIE 5600.]

[ORIE 4630 Operations Research Tools for Financial Engineering]

Fall. 3 credits. Prerequisites: engineering math through MATH 2940 and ENGRD 2700 and ORIE 3500. No previous knowledge of finance required.

Introduction to the applications of OR techniques, e.g., probability, statistics, and optimization, to finance and financial engineering. First reviews probability and statistics and then surveys assets returns, ARIMA time series models, portfolio selection, regression, CAPM, option pricing, GARCH models, fixed-income securities, resampling techniques, and behavioral finance. Also covers the use of MATLAB, MINITAB, and SAS for computation.

[ORIE 4710 Applied Linear Statistical Models]

Spring, weeks 1–7. 2 credits. Prerequisite: ENGRD 2700. Next offered 2010–2011.

Topics include multiple linear regression, diagnostics, model selection, inference, one and two factor analysis of variance. Theory and applications both treated. Use of MINITAB stressed.]

[ORIE 4711 Experimental Design]

Spring, weeks 8–14 (alternates with 4712). 2 credits. Prerequisite: ORIE 4710. Next offered 2010–2011.

Covers randomization, blocking, sample size determination, factorial designs, 2^p full and fractional factorials, response surfaces, Latin squares, split plots, and Taguchi designs. Engineering applications. Computing in MINITAB or SAS.]

[ORIE 4712 Regression]

Spring, weeks 8–14 (alternates with 4711). 2 credits. Prerequisite: ORIE 4710. Next offered 2011–2012.

Covers nonlinear regression, advanced diagnostics for multiple linear regression, collinearity, ridge regression, logistic regression, nonparametric estimation including spline and kernel methods, and regression with correlated errors. Computing in MINITAB or SAS.]

[ORIE 4740 Statistical Data Mining I]

Fall. 4 credits. Prerequisites: ORIE 3500 and MATH 2940 or equivalent; programming experience. Exposure to multiple linear regression and logistic regression strongly recommended..

Examines the statistical aspects of data mining, the effective analysis of large datasets. The first half of the course covers the process of building and interpreting statistical models in a variety of settings including multiple regression and logistic regression. The second half connects these ideas to techniques being developed to handle the large datasets that are now routinely encountered in scientific and business applications. Assignments are done using one or more statistical computing packages.

[ORIE 4800 Information Technology]

Spring. 4 credits. Pre- or corequisites: CS/ENGRD 2110, plus either ORIE 3800 or 3120.

This course covers a variety of fundamental aspects of information technology. Topics may include information transmission, storage, encryption and security; the value of information and the economics of information goods; databases, the Internet, World Wide Web, wireless and cellular networks, and peer-to-peer networks.

[ORIE 4810 Delivering OR Solutions with Information Technology]

Spring. 3 credits. Prerequisite: ORIE 4800. Next offered 2010–2011.

Study of ways information technology is used to deliver operations research methodology in real applications, including decision support systems, embedded operations research techniques, packaged software, and web-based techniques. Several actual applications are investigated. Labs introduce Visual Basic for Applications (VBA) for decision support.]

[ORIE 4820 Spreadsheet-Based Modeling and Data Analysis]

Spring. 3 credits. Prerequisites: ENGRD 2700, ORIE 3300 or equivalent.

Students develop and implement practical spreadsheet models to analyze data and evaluate decision problems in a hands-on learning environment. Microsoft Excel is heavily used. A wide variety of application areas are covered that incorporate concepts from probability, statistics, and constrained optimization.

ORIE 4850 Applications of Operations Research and Game Theory to Information Technology

Fall. 3 credits. Prerequisites: ORIE 3310, 3510, or permission of instructor.

Covers a variety of operations research and game theoretic problems arising in information technology. Examples include web searching, network routing and congestion control, online auctions, and trust and reputations in electronic interactions.

ORIE 4990 Teaching in ORIE

Fall, spring. Variable credit. Prerequisite: permission of instructor.

Involves working as a TA in an ORIE course. The instructor assigns credits (the guideline is 1 credit per four hours per week of work with a limit of 3 credits).

ORIE 4999 ORIE Project

Fall, spring. Variable credit. Prerequisite: permission of instructor.

Project-type work, under faculty supervision, on a real problem existing in some firm or institution. Opportunities in the course may be discussed with the associate director.

[ORIE 5100 Design of Manufacturing Systems

Fall. 4 credits. Prerequisite: ORIE seniors and graduate students in engineering and business school; permission of instructor. Next offered 2010–2011.

Project course in which students, working in teams, design a manufacturing logistics system and conduct capacity, material flow, and cost analysis of their design. Meetings between project teams and faculty advisors are substituted for some lectures. Analytical methods for controlling inventories, planning production, and evaluating system performance are presented in lectures.]

ORIE 5110 Case Studies

Fall. 1 credit. Prerequisite: M.Eng. students in ORIE.

Presents students with an unstructured problem that resembles a real-world situation. Students work in project groups to formulate mathematical models, perform computer analyses of the data and models, and present oral and written reports.

[ORIE 5120 Production Planning and Scheduling Theory and Practice

Fall. 4 credits. Corequisites: ORIE 3300, 3500. Next offered 2010–2011.

Topics include production planning, including MRP, linear programming, and related concepts. Scheduling and sequencing work in manufacturing systems. Job release strategies and control of work in process inventories. Focus is on setup time as a determinant of plans and schedules.]

[ORIE 5122 Inventory Management

Fall. 3 credits. Prerequisite: ORIE 3310, 3510, or permission of instructor. Next offered 2010–2011.

The first portion of this course is devoted to the analysis of several deterministic and probabilistic models for the control of single and multiple items at one of many locations. The second portion is presented in an experiential learning format. The focus is on analyzing and designing an integrated production and distribution system for a global company. Applications are stressed throughout.]

ORIE 5126 Supply Chain Management

Spring. 3 credits. Prerequisites: ORIE 3310, 3510, and one of the following: ORIE 3120, 5100, or 5122.

A supply chain is the scope of activities that convert raw materials (e.g., wheat) to finished products delivered to the end consumer (e.g., a box of cereal at the local P&C), usually spanning several corporations. Supply chain management focuses on the flow of products, information, and money through the supply chain. An overview of issues, opportunities, tools, and approaches. Emphasis is on business processes, system dynamics, control, design, re-engineering. Covers the relationship between the supply chain and the company's strategic position relative to its clients and its competition. Considers dimensions of inter-organizational relationships with partners, including decision-making, incentives, and risk.

ORIE 5127 Supply Chain Management for M.B.A. Students

Spring. 3 credits. Prerequisites: good standing in M.B.A. program; students not required to complete the math-based homework assignments.

For description, see ORIE 5126.

[ORIE 5130 Service System Modeling and Design

Spring. 3 credits. Corequisites: ORIE 3310 or 5311 and ORIE 3510; ability to program simple algorithms in some appropriate environment (e.g., VisualBasic or MATLAB). Next offered 2011–2012.

Today's economy is dominated by service industries. These systems differ from manufacturing industries in many ways, but primarily in the level of interaction with the customer. Examples of service systems include contact centers (aka call centers), airlines, and hospitals. This course covers various techniques that are useful in the analysis and design of such systems. It is structured around a number of cases that drive the need for the theory. The emphasis is on modeling and solving the models. Both operational and strategic decisions are covered through appropriate examples.]

ORIE 5140 Applied Systems Engineering (also CEE/CIS 5040, ECE 5120, MAE 5910)

Fall. 3 credits. Prerequisite: permission of instructor.

For description, see SYSEN 5100.

ORIE 5142 Systems Analysis Architecture, Behavior, and Optimization (also CEE/CIS 5050, ECE 5130, MAE 5920)

Spring. 3 credits. Prerequisite: CEE/CIS 5040, ECE 5120, ORIE 5140, or MAE 5910.

For description, see SYSEN 5200.

ORIE 5150 Economic Analysis of Engineering Systems

Spring. 4 credits. Prerequisites: ORIE 3300 and 3150. Lectures concurrent with ORIE 4150.

For description, see ORIE 4150.

ORIE 5190–5191 Selected Topics in Applied Operations Research

Fall, spring. Variable credit. Prerequisite: permission of instructor.

Current topics dealing with applications of operations research.

ORIE 5300 Operations Research I: Optimization I

For description, see ORIE 3300.

ORIE 5310 Optimization II

For description, see ORIE 3310.

ORIE 5311 Operations Research I: Topics in Linear Optimization

Spring. 1 credit. Pre- or corequisite: M.Eng. students in ORIE; ORIE 5300. Not open to students who have already taken ORIE 3310 or 5310.

Extension of ORIE 5300 that deals with applications and methodologies of dynamic programming, integer programming, and large-scale linear programming.

ORIE 5340 Heuristic Methods for Optimization (also CEE 5290, CIS 5720)

Fall. 3 or 4 credits. Prerequisite: graduate standing or CS/ENGRD 2110, 3510 or CEE/ENGRD 3200 or permission of instructors.

For description, see CEE 5290.

ORIE 5500 Engineering Probability and Statistics II

For description, see ORIE 3500.

ORIE 5510 Operations Research II: Introduction to Stochastic Processes I

For description, see ORIE 3510.

[ORIE 5520 Introductory Engineering Stochastic Processes II

Spring. 4 credits. Prerequisite: ORIE 3510 or equivalent. Next offered 2010–2011.

Lectures concurrent with ORIE 4520. For description, see ORIE 4520.]

[ORIE 5540 Extreme Value Analysis with Applications to Finance and Data Communications

Spring. 3 credits.

For description, see ORIE 4540.]

[ORIE 5550 Applied Time-Series Analysis

Fall. 3 credits. Prerequisites: ORIE 3510 and ENGRD 2700 or permission of instructor. Next offered 2010–2011.

The first part of this course treats regression methods to model seasonal and nonseasonal data. After that, Box-Jenkins models, which are versatile, widely used, and applicable to nonstationary and seasonal time series, are covered in detail. The various stages of model identification, estimation, diagnostic checking, and forecasting are treated. Analysis of real data is carried out. Assignments require computer work with a time-series package.]

[ORIE 5560 Queuing Systems: Theory and Applications

Fall. 3 credits. Prerequisite: ORIE 3510 or permission of instructor. Next offered 2011–2012.

Covers basic queuing models; delay and loss systems; finite source, finite capacity, balking, reneging; systems in series and in parallel; FCFS versus LCFS; busy period problems; output; design and control problems; priority systems; queuing networks; the product formula; time sharing; server vacations; and applications to equipment maintenance, computer operations and flexible manufacturing systems.]

ORIE 5580 Simulation Modeling and Analysis

Fall. 4 credits. Prerequisite: ORIE 3500 (may be taken concurrently) and CS/ENGRD 2110. Lectures concurrent with ORIE 4580.

For description, see ORIE 4580.

ORIE 5581 Monte Carlo Simulation

Fall, weeks 1-7. 2 credits. Co-meets with ORIE 4580.

Introduction to Monte Carlo simulation. Emphasis on tools and techniques needed in practice. Random variate, vector and process generation, input and output analysis, modeling.

ORIE 5582 Monte Carlo Methods in Financial Engineering

Spring, weeks 8-14. 2 credits. Prerequisite: ORIE 4580.

An overview of Monte Carlo methods as they apply in financial engineering. Generating sample paths. Variance reduction (including quasi random number), discretization, and sensitivities. Applications to derivative pricing and risk management.

ORIE 5600 Financial Engineering with Stochastic Calculus I

Fall. 4 credits. Prerequisite: knowledge of probability at level of ORIE 3500.

Introduction to continuous-time models of financial engineering and the mathematical tools required to use them, starting with the Black-Scholes model. Driven by the problem of derivative security pricing and hedging in this model, the course develops a practical knowledge of stochastic calculus from an elementary standpoint, covering topics including Brownian motion, martingales, the Ito formula, the Feynman-Kac formula, and Girsanov transformations.

ORIE 5610 Financial Engineering with Stochastic Calculus II

Spring. 4 credits. Prerequisite: ORIE 5600.

Building on the foundation established in ORIE 5600, this course presents no-arbitrage theories of complete markets, including models for equities, foreign exchange, and fixed-income securities, in relation to the main problems of financial engineering: pricing and hedging of derivative securities, portfolio optimization, and risk management. Other topics include model calibration and incomplete markets.

ORIE 5620 Credit Risk: Modeling, Valuation, and Management

Spring. 4 credits. Prerequisite: ORIE 3510 and 5600.

Credit risk refers to losses due to changes in the credit quality of a counter party in a financial contract. This course is an introduction to the modeling and valuation of credit risks. Emphasis is on credit derivative instruments used for hedging credit risks, including credit swaps, spread options, and collateralized debt obligations.

ORIE 5630 Computational Methods in Finance

Fall. 3 credits. Prerequisite: financial engineering M.Eng. students in Manhattan.

This course covers computational techniques such as binomial trees, solution of PDEs, and Monte Carlo simulation for pricing financial instruments such as European and American options, path-dependent options, and bonds. Other computational topics such as delta and gamma hedging, Value at Risk, and portfolio

problems will also be covered. The emphasis will be on implementation.

ORIE 5640 Statistics for Financial Engineering

Spring. 4 credits. Prerequisites: ORIE 3500/5500 and at least one of ORIE 4600, 4630, or 5600.

Regression, ARIMA, GARCH, stochastic volatility, and factor models. Calibration of financial engineering models. Estimation of diffusion models. Estimation of risk measures. Multivariate models and copulas. Bayesian statistics. Students will be instructed in the use of R software; prior knowledge of R is helpful but not required. This course is intended for M.Eng. students in financial engineering and assumes some familiarity with finance and financial engineering. Students not in the financial engineering program are welcome if they have a suitable background. Students with no background in finance should consider taking ORIE 4630 instead.

[ORIE 5650 Quantitative Methods of Financial Risk Management

Spring. 3 credits. Prerequisite: ORIE 3500. Next offered 2010-2011.

A historical perspective of market risk measurement including the Markowitz, CAPM and APT models, a description of the value-at-risk approach and an overview of VaR variants and extensions such as delta-VaR, CVaR etc. The course will survey other methods for evaluating risk and consider multivariate methods for evaluating portfolios requiring copula tools which have become popular. Topics in credit risk: methods for determining default probabilities and company ratings based on financial ratios (logit, probit and discriminant analysis, decision trees, etc.), and approaches to measuring credit risk which can be roughly divided into structural models and reduced-form models.]

ORIE 5660 Bond Mathematics and Mortgage-Backed Securities

Fall. 3 credits. Prerequisite: financial engineering M.Eng. students in Manhattan.

A transaction-oriented course covering U.S. Bond markets. The course covers valuation, trading strategies, and risk profiles of bonds, with a special emphasis on mortgage-backed securities.

[ORIE 5770 Quality Control

Fall. 3 credits. Prerequisite: ENGRD 2700. Next offered 2010-2011.

Covers concepts and methods for process and acceptance control; control charts for variables and attributes; process capability analysis; acceptance sampling; continuous sampling plans; life tests; and use of experimental design and Taguchi methods for off-line control.]

ORIE 5910 Master of Engineering Manufacturing Project

Fall, R grade only; spring, 5 credits. Prerequisite: M.Eng. students enrolled in manufacturing option.

Project course coordinated by Center for Manufacturing Enterprise.

ORIE 5912-5913-5914 Special Topics in Financial Engineering

Fall. 1-8 credits. Prerequisite: financial engineering M.Eng. students in Manhattan.

Module-based courses focusing on topics relevant to current financial markets. Practitioner-led segments will cover a wide range of quantitative and qualitative topics in the securities industry.

ORIE 5940 Systems Engineering Project

Fall; R grade only; spring, 8 credits. Prerequisite: M.Eng. students enrolled in systems engineering option.

Substantial, group-based design project that has a strong systems design component. The project must be approved by an ASE 1 instructor before the student enrolls in the course. (The following projects are pre-approved: FSAE, HEV, Robocup, Brain.) A formal report is required.

ORIE 5960 Applied Financial Engineering

Fall and spring. 5 credits. Prerequisite: ORIE and M.Eng. students concentrating in financial engineering.

Project course satisfying the engineering design project requirement for financial engineering M.Eng. students.

ORIE 5961 Applied Financial Engineering

Fall. 5 credits. Prerequisite: financial engineering M.Eng. students in Manhattan.

Project course in Manhattan satisfying the engineering design project requirement for the M.Eng degree.

ORIE 5980 Project

Fall, R grade only; spring, 5 credits. Prerequisite: M.Eng. students.

Identification, analysis, design, and evaluation of feasible solutions to some applied problem in the ORIE field. A formal report and oral defense of the approach and solution are required.

[ORIE 6122 Advanced Production and Inventory Planning

Spring. 3 credits. Next offered 2011-2012.

Introduction to a variety of production and inventory control planning problems, the development of mathematical models corresponding to these problems, and a study of approaches for finding solutions.]

[ORIE 6127 Computational Issues in Large Scale Data-Driven Models

Fall. 3 credits. Pre- or corequisites: ORIE 6300, 6500 and 6700. Next offered 2010-2011.

Availability of massive datasets such as web logs and point-of-sale transactions raises new modeling and computational issues. This course provides an introduction to this emerging research area. Topics include data-driven models in operation management, asymptotic statistics, uniform convergence of empirical process, and efficient computational methods. There is discussion of applications in engineering, economics, and marketing, along with current open research problems.]

[ORIE 6140 Mathematical Modeling of Operational Systems

Fall. 2 credits. Prerequisites: ORIE 6300, 6500, or equivalent. Next offered 2011-2012.

The art and science of developing, using and explicating mathematical models, presented in a studio/workshop environment. Structuring of a variety of operational "situations" so they can be reasonably represented by a mathematical model. Extensive class discussion and out-of-class investigation of potential mathematical approaches to each situation. Incorporation of data analysis.]

ORIE 6300 Mathematical Programming I

Fall. 4 credits. Prerequisites: advanced calculus and elementary linear algebra.

Rigorous treatment of the theory and computational techniques of linear programming and its extensions, including

formulation, duality theory, algorithms; sensitivity analysis; network flow problems and algorithms; theory of polyhedral convex sets, systems of linear equations and inequalities, Farkas' Lemma; and exploiting special structure in the simplex method and computational implementation.

ORIE 6310 Mathematical Programming II

Spring. 4 credits. Prerequisite: ORIE 6300. Continuation of ORIE 6300. Introduces nonlinear programming, interior-point methods for linear programming, complexity theory, and integer programming. Includes some discussion of dynamic programming and elementary polyhedral theory.

ORIE 6320 Nonlinear Programming

Spring. 3 credits. Prerequisite: ORIE 6300. Necessary and sufficient conditions for unconstrained and constrained optima. Topics include the duality theory, computational methods for unconstrained problems (e.g., quasi-Newton algorithms), linearly constrained problems (e.g., active set methods), and nonlinearly constrained problems (e.g., successive quadratic programming, penalty, and barrier methods).

ORIE 6325 Interior-Point Methods for Mathematical Programming

Fall. 3 credits. Prerequisites: MATH 4110 and ORIE 6300, or permission of instructor. Next offered 2011–2012.

Interior-point methods for linear, quadratic, and semidefinite programming and, more generally, for convex programming. Discusses the basic ingredients—barrier functions, central paths, and potential functions—that go into the construction of polynomial-time algorithms and various ways of combining them. Emphasizes recent mathematical theory and the most modern viewpoints.]

ORIE 6327 Semidefinite Programming

Spring. 3 credits. Pre- or corequisite: ORIE 6325. Next offered 2010–2011.

Covers linear optimization over the cone of positive semidefinite symmetric matrices; applications to control theory, eigenvalue optimization, and strong relaxations of combinatorial optimization problems; duality; computational methods, particularly interior-point algorithms.]

ORIE 6328 Convex Analysis

Spring. 3 credits. Prerequisite: ORIE 6300 or permission of instructor. Next offered 2011–2012.

Self-contained development of convex analysis and optimization. Convex sets and functions, subgradients, continuity, Fenchel, conic, and Lagrangian duality. Nonsmooth analysis: Clarke and limiting subgradients. Self-concordance and smooth convex optimization. Bundle methods for nonsmooth convex optimization.]

ORIE 6330 Graph Theory and Network Flows

Fall. 3 credits. Prerequisite: permission of instructor. Next offered 2010–2011.

Topics include directed and undirected graphs; bipartite graphs; Hamilton cycles and Euler tours; connectedness, matching, and coloring; flows in capacity-constrained networks; and maximum flow and minimum cost flow problems.]

ORIE 6334 Combinatorial Optimization

Fall. 3 credits.

Topics in combinatorics, graphs, and networks, including matching, matroids,

polyhedral combinatorics, and optimization algorithms.

[ORIE 6335 Scheduling Theory

Spring. 3 credits. Next offered 2011–2012. Scheduling and sequencing problems, including single-machine problems, parallel-machine scheduling, and shop scheduling. The emphasis is on the design and analysis of polynomial time optimization and approximation algorithms and on related complexity issues.]

[ORIE 6336 Integer Programming

Fall. 3 credits. Prerequisite: ORIE 6300. Next offered 2010–2011.

Topics include discrete optimization; linear programming in which the variables must assume integral values; theory, algorithms, and applications; and cutting-plane and enumerative methods, with additional topics drawn from recent research in this area.]

[ORIE 6350 Foundations of Game Theory and Mechanism Design for Engineering Applications

Fall. 3 credits. Prerequisite: basic knowledge of operations research at level of ORIE 6300 and 6500. No prior knowledge of game theory or computer networks assumed. Next offered 2010–2011.

Provides a rigorous foundation for the applications of game theory and mechanism design to problems in operations research and computer science. The goal is to develop a deep understanding of the fundamental issues that are important in many applications while presenting many current open research problems.]

ORIE 6500 Applied Stochastic Processes

Fall. 4 credits. Prerequisite: one-semester calculus-based probability course. Introduction to stochastic processes that presents the basic theory together with a variety of applications. Topics include Markov processes, renewal theory, random walks, branching processes, Brownian motion, stationary processes, martingales, and point processes.

ORIE 6510 Probability

Spring. 4 credits. Prerequisite: real analysis at level of MATH 4130; one-semester calculus-based probability course.

Covers sample spaces, events, sigma fields, probability measures, set induction, independence, random variables, expectation, review of important distributions and transformation techniques, convergence concepts, laws of large numbers and asymptotic normality, and conditioning.

[ORIE 6540 Advanced Stochastic Processes

Fall. 3 credits. Prerequisite: ORIE 6510 or equivalent. Next offered 2010–2011.

Topics include Brownian motion, martingales, Markov processes, and topics selected from: diffusions, stationary processes, point processes, weak convergence for stochastic processes and applications to diffusion approximations, Lévy processes, regenerative phenomena, random walks, and stochastic integrals.]

[ORIE 6570 Queues and Control of Queues: The Dynamic Programming Approach

Fall. 3 credits. Next offered 2010–2011.

We will cover basic queueing theory followed by an introduction to Markov decision

processes (MDPs). The second part of the class will cover the use of MDPs to develop control policies in a variety of queueing settings.]

[ORIE 6580 Simulation

Spring. 3 credits. Prerequisite: computing experience and ORIE 6500 or equivalent, or permission of instructor. Next offered 2010–2011.

Introduction to Monte Carlo and discrete-event simulation. Emphasizes underlying theory. Random variate generation, input and output analysis, variance reduction, selection of current research topics.]

[ORIE 6600 Mathematical Finance I

Spring. 3 credits. Prerequisite: ORIE 6500. Next offered 2011–2012.

Introduction to mathematical finance in discrete time for Ph.D. students. The course covers arbitrage theory, pricing and hedging of derivative securities. American contingent claims, investor preferences and corresponding optimization problems, risk measures, and imperfect hedging strategies.]

ORIE 6610 Mathematical Finance II

Spring. 3 credits. Prerequisites: ORIE 6500, ORIE 6510, and ORIE 6600.

Introduction to stochastic calculus, stochastic differential equations, and applications to continuous-time finance such as the Black-Scholes formula, local and stochastic volatility models, and term structure models for interest rates of volatilities. Corresponding mathematical foundations such as martingale theory, Itô integration, and Girsanov's theorem are also provided.

[ORIE 6630 Empirical and Computational Issues in Finance

Spring. 3 credits. Prerequisites: stochastic processes course at level of ORIE 6500; statistics course at level of ORIE 6700, or permission of instructor. Next offered 2010–2011.

Designed to introduce students to existing empirical work in finance and to demonstrate the use of statistical, econometric, and numerical methods in the analysis of financial data. Topics include linear and nonlinear time series analysis, high-frequency data and market microstructure, continuous-time models, extreme values and quantile estimation, volatility models, and MCMC methods. Numerous applications using market data are presented. MATLAB programming skills are useful.]

ORIE 6700 Statistical Principles

Fall. 4 credits. Corequisite: ORIE 6500 or equivalent.

Topics include review of distribution theory of special interest in statistics: normal, chi-square, binomial, Poisson, t, and F; introduction to statistical decision theory; sufficient statistics; theory of minimum variance unbiased point estimation; maximum likelihood and Bayes estimation; basic principles of hypothesis testing, including Neyman-Pearson Lemma and likelihood ratio principle; confidence interval construction; and introduction to linear models.

[ORIE 6710 Intermediate Applied Statistics

Spring. 3 credits. Prerequisite: ORIE 6700 or equivalent. Next offered 2011–2012.

Topics include statistical inference based on the general linear model; least-squares estimators and their optimality properties;

likelihood ratio tests and corresponding confidence regions; and simultaneous inference. Applications in regression analysis and ANOVA models. Covers variance components and mixed models. Use of the computer as a tool for statistics is stressed.]

ORIE 6720 Sequential Methods in Statistics

Spring, 3 credits. S-U grades only. Next offered 2010-2011.

The statistical theory of sequential design and analysis of experiments has many applications; including monitoring data from clinical trials in medical studies and quality control in manufacturing operations. This course covers classical sequential hypothesis tests, Wald's SPRT, stopping rules, Kiefer-Weiss test, optimality, group sequential methods, estimation, repeated confidence intervals, stochastic curtailment, adaptive designs, and Bayesian and decision theoretic approaches.]

ORIE 6740 Statistical Learning Theory for Data Mining

Fall, 3 credits. Prerequisites: probability course at level of ORIE 6510; statistics course at level of ORIE 6700. Next offered 2010-2011.

Provides a thorough grounding in probabilistic and computational methods for statistical data mining. Covers a subset of the following topics from supervised and unsupervised data mining: the framework of learning. Performance measures and model selection. Methodology, theoretical properties and computing algorithms used in parametric and nonparametric methods for regression and classification. Frequentist and Bayesian methods.]

ORIE 6780 Bayesian Statistics and Data Analysis

Spring, 3 credits. Prerequisites: ORIE 6700 or an equivalent course in mathematical statistics.

Priors, posteriors, Bayes estimators, Bayes factors, credible regions, hierarchical models, computational methods (especially MCMC), empirical Bayes methods, Bayesian robustness. Includes data analysis and MCMC computation using R and WinBUGS.

ORIE 7190-7191 Selected Topics in Applied Operations Research

Fall, spring, Credit TBA.

Current research topics dealing with applications of operations research.

ORIE 7390-7391 Selected Topics in Mathematical Programming

Fall, spring, Credit TBA.

Current research topics in mathematical programming.

ORIE 7590-7591 Selected Topics in Applied Probability

Fall, spring, Credit TBA.

Topics are chosen from current literature and research areas of the staff.

ORIE 7790-7791 Selected Topics in Applied Statistics

Fall, spring, Credit TBA.

Topics are chosen from current literature and research of the staff.

ORIE 7900 Special Investigations

Fall, spring, Credit TBA.

For individuals or small groups. Study of special topics or problems.

ORIE 9000 Operations Research Graduate Colloquium

Fall, spring, 1 credit.

Weekly one and one-half hour meeting devoted to presentations by distinguished visitors, by faculty members, and by advanced graduate students on topics of current research in the field of operations research.

ORIE 9100-9101 Enterprise Engineering Colloquium (also MAE 5940)

9100, fall; 9101, spring, 1 credit each semester. S-U grades.

Weekly meeting for master of engineering students. Discussion with industry speakers and faculty members on the uses of engineering in the economic design, manufacturing, marketing, and distribution and goods and services.

ORIE 9110 M.Eng. Professional Review

Fall, 1 credit. Limited to ORIE M.Eng. students in their second or third semester. S-U grades only.

An interactive course in which students present findings and share lessons from their summer internship experiences.

ORIE 9160 Seminar in Financial Engineering

Fall, 1 credit. Prerequisites: Limited to Financial Engineering M.Eng. students in Manhattan.

Weekly roundtable meeting for students concentrating in financial engineering. Current market events, practices, and research will be discussed with faculty and financial industry partners.

ORIE 9999 Thesis Research

Fall, spring, Credit TBA.

For individuals doing thesis research for master's or doctoral degrees.

SYSTEMS ENGINEERING

P. L. Jackson, director; A. R. George, assoc. director; L. K. Nozick, director of graduate studies; M. Campbell, E. Garcia, H. O. Gao, A. S. Lewis, J. A. Muckstadt, A. F. Myers, M. Peck, F. B. Schneider, B. Selman, C. A. Shoemaker, J. R. Stedinger, R. J. Thomas, H. Topaloglu, M. A. Turnquist, F. J. Wayno, Jr.

SYSEN 1100 Getting Design Right: A Systems Approach

Summer, six-week session, 3 credits. Web-delivered. Prerequisites: high school mathematics and science and familiarity with spreadsheet modeling (e.g., Microsoft Excel). P. L. Jackson.

This course is a freshman-level exposure to the product design process. The process of getting design right is sometimes called systems engineering. We explain the process using the acronym DMEODVEI (Define, Measure, Explore, Optimize, Develop, Validate, Execute, and Iterate). The process begins with understanding customer requirements and ends with executing the design to satisfy those requirements. It can then be iterated to greater levels of design detail. The focus is not on detailed engineering design but rather on the process of ensuring that the detailed design will meet the needs of the customer. Students work through the steps of the process with reference to a particular product design challenge. The course is web-delivered using the Blackboard learning instruction system.

SYSEN 5100 Applied Systems Engineering (also CEE/CIS 5040, ECE/ ORIE 5120, MAE 5910)

Fall, 3 credits. Prerequisites: senior or graduate standing in an engineering field; concurrent or recent (past two years) enrollment in group-based project with strong system design component approved by course instructor. M. Peck, A. R. George, and P. Jackson.

Fundamental ideas of systems engineering, and their application to design and development of various types of engineered systems. Defining system requirements, creating effective project teams, mathematical tools for system analysis and control, testing and evaluation, economic considerations, and the system life cycle. Students majoring in Systems Engineering enroll in SYSEN 5100. Students taking the minor in Systems Engineering enroll in CEE/CIS 5040, ECE/ORIE 5120, or MAE 5910. Students in distance-learning programs enroll in SYSEN 5110. Course is identical for all versions.

SYSEN 5110 Applied Systems Engineering

Fall, 3 credits. Intended for off-campus students. Prerequisites: senior or graduate standing in engineering field; concurrent or recent (past two years) enrollment in group-based project with strong system design component approved by course instructor. Staff.

For description, see SYSEN 5100.

SYSEN 5200 Systems Architecture, Behavior, and Optimization (also MAE 5920, CEE/CIS 5050, ECE 5130, ORIE 5142)

Spring, 3 credits. Prerequisite: Applied System Engineering MAE 5910, CEE/CIS 5040, ECE/ORIE 5120, SYSEN 5100 or 5110, or permission of instructor. Students majoring in Systems Engineering enroll in SYSEN 5200. Students taking the minor in Systems Engineering enroll in MAE 5920, CEE 5252, CIS 5050, ECE 5130, or ORIE 5142. Students in distance learning programs enroll in SYSEN 5210. Course is identical for all versions. H. Topaloglu.

This is an advanced course in the application of the systems engineering process to the architecture design and operation of complex systems. Topics include techniques for design, simulation, optimization, and control of complex systems. Case studies and system simulations in diverse areas provide context for the application of these techniques.

SYSEN 5210 Systems Architecture, Behavior, and Optimization

Spring, 3 credits. Intended for off-campus students. Prerequisites: Applied Systems Engineering or permission of instructor. Staff.

For description, see SYSEN 5200.

SYSEN 5300 Systems Engineering for the Design and Operation of Reliable Systems (also MAE 5930)

Fall, 3-4 credits. Prerequisites: SYSEN 5100 or either ENGRD 2700 or CEE 3040 or permission of instructors. H. O. Gao.

Develops skills in the design, operation and control of systems for reliable performance. Focuses on four key themes; risk analysis (with a particular emphasis on risk assessment and risk characterization), modeling system reliability (including the development of statistical models based on accelerated life testing), quality control techniques and the

optimization of system design for reliability. Students in distance-learning programs enroll in SYSEN 5310. Lectures are identical for all versions.

SYSEN 5310 Systems Engineering for the Design and Operation of Reliable Systems

Fall. 3–4 credits. Prerequisites: SYSEN 5100 and either ENGRD 2700 or CEE 3040 or permission of instructor. H. O. Gao. Intended for off-campus students. For description, see SYSEN 5300.

SYSEN 5700 Special Topics in Systems Engineering

Offered on demand. 1–4 credits. Staff. Supervised study by individuals or small groups of one or more specialized topics not covered in regular courses.

SYSEN 5710 Practicum in Systems Engineering

Offered on demand. 1–4 credits. Staff. Supervised study by individuals or small groups of one or more specialized topics not covered in regular courses.

SYSEN 5750 Independent Study in Systems Engineering

Offered on demand. 1.5–6 credits. Staff. Supervised study by individuals or small groups of one or more specialized topics not covered in regular courses.

SYSEN 5760 Systems Engineering Project—Track I

Offered on demand. 1.5–6 credits. Prerequisite: permission of instructor. Staff. A design project that incorporates the principles of systems engineering for a complex system. Projects are performed by teams of students working together to meet the requirements of the project.

SYSEN 5770 Systems Engineering Project—Track II

Offered on demand. 1.5–6 credits. Prerequisite: permission of instructor. Staff. A design project that incorporates the principles of systems engineering for a complex system. Projects are performed by teams of students working together to meet the requirements of the project.

SYSEN 5900 Systems Engineering Design Project

1–8 credits. Prerequisite: permission of instructor. Staff. A design project that incorporates the principles of systems engineering for a complex system. Projects are performed by teams of students working together to meet the requirements of the project.

SYSEN 5920 Systems Engineering Management for Virtual Teams

Summer. 1 credit. Prerequisites: matriculation in Systems Engineering Master of Engineering distance learning degree program. P. L. Jackson and F. J. Wayno. First of two one-week intensive experiential courses (35 hours) in systems engineering management, with emphasis on laying the social groundwork for students to conduct projects in geographically dispersed teams. Course involves a significant design challenge that must be completed within the week. A leadership laboratory is run simultaneously with the design experience to encourage students to self-assess their leadership style and practices in systems engineering projects.

SYSEN 5940 Creativity and Innovation Within Systems Engineering

Summer. 1 credit. Prerequisites: matriculation in M.Eng. (Systems Engineering) distance learning degree program; CEE 6910 Principles of Project Leadership; SYSEN 5920. P. L. Jackson and F. J. Wayno. Second of two one-week intensive courses (35 hours) in systems engineering management with emphasis on understanding individual creativity and organizational innovation and on developing the required systems engineering leadership skills to foster both.

SYSEN 5960 Systems Engineering Design Project for Virtual Teams

Fall, spring, summer. Variable credit. Prerequisites: matriculation in Systems Engineering M.Eng. distance learning degree program; SYSEN 5100, SYSEN 5920, SYSEN 5940, and SYSEN 6910, or permission of instructor. Staff. Systems engineering project for geographically dispersed teams. Fulfills M.Eng. degree requirement for project, subject to credit hour minimum.

SYSEN 6800 Topics in Systems Engineering Research

Spring. 1.5 credits. Staff. Advanced topics in systems engineering research.

THEORETICAL AND APPLIED MECHANICS

A. T. Zehnder, chair; J. A. Burns, K. B. Cady, J. M. Guckenheimer, T. J. Healey, C. Y. Hui, J. T. Jenkins, S. Mukherjee, S. L. Phoenix, R. H. Rand, A. L. Ruina, W. H. Sachse, S. Strogatz, Z. J. Wang. Emeritus: E. Cranch, R. H. Lance.

Basics in Engineering Mechanics

TAM 2020 Mechanics of Solids (also ENGRD 2020)

Fall, spring. 4 credits. Prerequisite: PHYS 1112, co-registration in MATH 1920, or permission of instructor. For description, see ENGRD 2020.

TAM 2030 Dynamics (also ENGRD 2030)

Fall, spring. 3 credits. Prerequisite: TAM 2020, co-registration in MATH 2930, or permission of instructor. For description, see ENGRD 2030.

Engineering Mathematics

TAM 3100 Introduction to Applied Mathematics I

Fall, spring. 3 credits. Prerequisites: MATH 2930 and 2940. Covers initial value, boundary value, and eigenvalue problems in linear ordinary differential equations. Also covers special functions, linear partial differential equations. This is an introduction to probability and statistics. Use of computers to solve problems is emphasized.

TAM 6100 Methods of Applied Mathematics I

Fall. 3 credits. Intended for beginning graduate students in engineering and science. Intensive course requiring more time than normally available to undergraduates (see TAM 3100–3110) but open to exceptional undergraduates by permission of instructor.

Emphasis is on applications. Course covers linear algebra, calculus of several variables, vector analysis, series, ordinary differential equations, and complex variables.

TAM 6110 Methods of Applied Mathematics II

Spring. 3 credits. Prerequisite: TAM 6100 or equivalent. Emphasis is on applications. Course covers partial differential equations, transform techniques, tensor analysis, and calculus of variations.

TAM 6120 Methods of Applied Mathematics III

Spring. 3 credits. Prerequisite: TAM 6100 and 6110 or equivalent. Next offered 2010–2011. Topics include integral transform, methods, Wiener-Hopf technique, solutions of integral equations and partial differential equations.]

TAM 6130 Asymptotics and Perturbation Methods

Fall. 3 credits. Prerequisites: TAM 6100 and 6110 or equivalent. Topics include asymptotic behavior of solutions of linear and nonlinear ODE (e.g., the WKB boundary layer and multiple-scale methods) and asymptotic expansion of integrals (method of steepest descent, stationary phase, and Laplace methods). Also covers regular and singular perturbation methods for PDE (e.g., method of composite expansions). Other topics (depending on instructor) may include normal forms, center manifolds, Liapunov-Schmidt reducers, and Stokes phenomenon. The course may also include computer exercises at the option of the instructor.

TAM 6170 Advanced Mathematical Modeling—Biological and Fluid Dynamics

Spring. 3 credits. Covers the fundamentals of fluid dynamics that rises in biological fluid dynamics such as the motion of the microscope cells in low Reynolds number flows and unsteady aerodynamics of flapping flight and free falling objects. The topics in fluid dynamics include Stokes flow, propulsion of a beating flagellum and swimming sheets, potential flow, unsteady airfoil theory, reduced model of unsteady forces on a fluttering and tumbling object, and computational methods. The current research in biofluids will be discussed in some depth.

TAM 7180 Topics in Bifurcation Theory

Spring. 3 credits. Offered every third year. Provides a basic, rigorous introduction to certain aspects of nonlinear analysis, with an emphasis on techniques based on differential calculus. Applications to nonlinear elasticity and nonlinear oscillations of mechanical systems (including Liapunov Center Theorem, Hopf Bifurcation, and Hamiltonian-Hopf bifurcation) will be presented throughout. The course is intended for students in the physical and mathematical sciences. The minimal prerequisites are linear algebra, advanced calculus, differential equations, and eigenvalue problems. Exposure to nonlinear problems of engineering science or mathematical physics and some background in basic functional analysis is helpful but not required.

Continuum Mechanics

TAM 4550 Introduction to Composite Materials (also CEE 4770, MAE 4550, MSE 5550)

Fall. 3 credits. Prerequisite: ENGRD 2020. Topics include introduction to composite materials; varieties and properties of fiber reinforcements and matrix materials; micromechanics of stiffness and stress transfer in discontinuous fiber/matrix arrays; orthotropic elasticity as applied to parallel fibers in a matrix and lamina; theory of stiffness (tension, bending, torsion) and failure of laminates and composite plates, including computer software for design; and manufacturing methods and applications for composites. There is a group component design and manufacturing paper required, and a group laboratory on laminated component fabrication.

TAM 5910 Master of Engineering Design Project I

Fall. 3-12 credits, variable. M.Eng. (mechanics) project related to the master of engineering in mechanics.

TAM 5920 Master of Engineering Design Project I

Spring. 3-12 credits, variable. M.Eng. (mechanics) project related to the master of engineering in mechanics.

TAM 6550 Advanced Composite Materials (also CEE 6760, MAE/MSE 6550)

Spring. 4 credits. TAM 4550/5550 not a prerequisite but excellent background. Topics center around micromechanical and statistical (reliability) aspects of the strength and fatigue of fibrous composites. Topics include Hedgepeth shear-lag models of stress transfer around arrays of fiber breaks; statistical theories of composite failure to forecast reliability; stress distributions around holes and cuts in composite laminates; and compressive strength of composites.

TAM 6630 Solid Mechanics I

Fall. 4 credits. Rigorous introduction to solid mechanics emphasizing linear elasticity: tensors; deformations, rotations and strains; balance principles; stress; small-strain theory; linear elasticity, anisotropic and isotropic; basic theorems of elastostatics; and boundary-value problems, e.g., plates, St. Venant's solutions.

TAM 6640 Solid Mechanics II

Spring. 4 credits. Prerequisites: MATH 6110 and TAM 6630 or equivalent. Preparation for advanced courses in solid mechanics. Topics include singular solutions in linear elasticity; plane stress, plane strain, anti-plane shear, airy stress functions; linear viscoelasticity; cracks and dislocations; classical plasticity; thermoelasticity; and three-dimensional elasticity.

TAM 7510 Continuum Mechanics and Thermodynamics

Spring. 3 credits. Prerequisites: TAM 6100 and 6110; and 6630 and 6640 or equivalents. Course topics include kinematics; conservation laws; the entropy inequality; constitutive relations: frame indifference, material symmetry; and finite elasticity, rate-dependent materials, and materials with internal state variables.

[TAM 7520 Nonlinear Elasticity

Spring. 3 credits. Prerequisites: TAM 6100, 6110, and 7510 or equivalents. Next offered 2010-2011.

Review of governing equations. Topics include linearization and stability; constitutive inequalities; exact solution of special problems.]

[TAM 7530 Fracture

Spring. 3 credits. Prerequisites: TAM 6100 or 6110; and 6630 and 6640 or equivalents. Next offered 2010-2011.

Also covers nonlinear rate-independent, small-scale deformation fracture mechanics: plastic fracture, J-integrals.]

TAM 7570 Inelasticity

Fall. 3 credits. Plasticity: dislocations and slip systems; early experimental observations; torsion and bending of bars; inflation of thick cylinders and spheres; general equations governing yielding, flow and work hardening; solution of general boundary value problems; numerical solutions radial return and the consistent tangent operator. Linear viscoelasticity: simple rheological models; correspondence principle; hereditary integral approach; torsion and bending of bars; inflation of thick cylinders and spheres; solution of general quasi-static boundary value problems; thermoviscoelasticity, wave propagation.

[TAM 7590 Boundary Element Methods

Spring. 4 credits. Next offered 2010-2011. Topics include a variety of applications of the boundary element method. Examples are: potential theory, linear elasticity, elastoplasticity, micro and nano-electro-mechanical systems, meshfree boundary methods.]

Dynamics and Space Mechanics

TAM 5700 Intermediate Dynamics

Fall. 3 credits. Topics include Newtonian mechanics; motion in rotating coordinate systems; introduction to analytical mechanics; virtual work, Lagrangian mechanics; Hamilton's principle; small vibration and stability theory. Newtonian-Eulerian mechanics of rigid bodies; and gyroscopes. As time allows, introduction to orbital mechanics and chaos may be offered.

TAM 5780 Nonlinear Dynamics and Chaos

Spring. 3 credits. Prerequisite: MATH 2930 or equivalent. Introduction to nonlinear dynamics, with applications to physics, engineering, biology, and chemistry. Emphasizes analytical methods, concrete examples, and geometric thinking. Topics include one-dimensional systems; bifurcations; phase plane; nonlinear oscillators; and Lorenz equations, chaos, strange attractors, fractals, iterated mappings, period doubling, renormalization.

TAM 6680 Elastic Waves in Solids with Applications

Fall. 3 credits. Waves in one-dimensional elastic solids; two-dimensional systems; waves in infinite media, plates and rods; significant emphasis on measurements and applications.

[TAM 6710 Hamiltonian Dynamics

Spring. 3 credits. Prerequisite: TAM 5700 or equivalent. Next offered 2010-2011. Course topics include review of Lagrangian mechanics, Kanes equations, Hamiltons principle, Hamiltons, canonical equations, Lie

transforms, Hamilton-Jacobi theory; KAM theory; and Melnikovs method.]

[TAM 6720 Celestial Mechanics (also ASTRO 6579)

Spring. 3 credits. Next offered 2010-2011. Course topics include description of orbits; Hill curves, libration points; osculating orbital elements, perturbation equations; effects of forces on satellite orbits; mechanics of planetary rings.]

[TAM 6730 Mechanics of the Solar System (also ASTRO 6571)

Spring. 3 credits. Prerequisite: advanced undergraduate course in dynamics. Next offered 2010-2011. Topics include gravitational potentials, planetary gravity fields; free and forced rotations; Chandler wobble, polar wander, and damping of nutation.]

TAM 6750 Nonlinear Vibrations

Spring. 3 credits. Prerequisite: TAM 5780 or equivalent. Dynamics of nonlinear oscillators, including free and forced vibrations of both conservative and limit cycle oscillators, parametric excitation, systems of two, and N-coupled oscillators. Mathematical techniques include perturbation methods, center manifold reduction, and differential-delay equations.

TAM 7760 Applied Dynamical Systems (also MATH 7170)

Spring. 4 credits. For description, see MATH 7170.

TAM 7960 Mechanics of Terrestrial Locomotion

Spring. 3 credits. Prerequisite: TAM 5700 or equivalent, or A+ level understanding of any sophomore (or above) mechanics course.

The energetics and stability of people, other legged animals and robots are studied by mechanical analysis of simple mechanics-based models. Students will derive equations, do analytic and computer calculations, and write up their results. Advanced students may do original research as part of their course work. (A *Nature* paper was based on research started as course work in this class one year.)

Special Courses, Projects, and Thesis Research

TAM 4130 Introduction to Nuclear Science and Engineering (also AEP/CHEM/ECE/NSE 4130, MAE 4580)

Fall. 3 credits. K. B. Cady. For seniors and M.Eng. students interested in nuclear energy. Topics are presented at the level of the course text: Lamarsh and Baratta, *Introduction to Nuclear Engineering*, 3rd ed. and includes the fundamentals of nuclear science and engineering: nuclear structure, radioactivity, and reactions; interaction of radiation with matter; radiation protection and shielding; the neutron chain reaction and its control; light water reactors, isotope separation, fuel reprocessing, and waste disposal; heat transfer, accidents, atmospheric dispersion, and reactor licensing and safety.

TAM 4140 Nuclear Reactor Physics (also AEP/CHEM/ECE/NSE 4140)

Spring. 3 credits. The physics of the neutron chain reaction for seniors, M.Eng., and graduate students interested in nuclear energy. Topics are

presented at the level of Lamarsh's *Introduction to Nuclear Reactor Theory*, and include low-energy nuclear physics; neutron interactions; nuclear fission and the chain reaction; the moderation of neutrons; the multi-cell collision probability model; neutron diffusion; reactor dynamics and control; the burn-up, build-in, and decay of actinides; linear heat rates and reactor power distributions.

TAM 4910-4920 Project in Engineering Science

4910, fall; 4920, spring. 1-4 credits TBA. Projects for undergraduates under the guidance of a faculty member.

TAM 7960-8000 Topics in Theoretical and Applied Mechanics

Fall, spring. 1-3 credits TBA. Special lectures or seminars on subjects of current interest. Topics are announced when the course is offered.

TAM 8900 Master's Degree Research in Theoretical and Applied Mechanics

Fall, spring. 1-15 credits TBA. S-U grades. Thesis or independent research at the M.S. level on a subject of theoretical and applied mechanics. Research is under the guidance of a faculty member.

TAM 9900 Doctoral Research in Theoretical and Applied Mechanics

Fall, spring. 1-15 credits TBA. S-U grades. Thesis or independent research at the Ph.D. level on a subject of theoretical and applied mechanics. Research is under the guidance of a faculty member.

FACULTY ROSTER

- Abel, John F., Ph.D., U. of California, Berkeley. Prof. (Emeritus), Civil and Environmental Engineering, Emeritus
- Afshari, Ehsan, Ph.D., California Inst. of Technology. Asst. Prof., Electrical and Computer Engineering
- Ahner, Beth A., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Biological and Environmental Engineering
- Albonesi, David H., Ph.D., U. of Massachusetts. Assoc. Prof., Electrical and Computer Engineering
- Albright, Louis D., Ph.D., Cornell U. Prof., Biological and Environmental Engineering
- Allmendinger, Richard, Ph.D., Stanford U. Prof., Earth and Atmospheric Sciences
- Allmon, Warren D., Ph.D., Harvard U. Hunter R. Rawlings III Professor of Paleontology, Earth and Atmospheric Sciences
- Andronicos, Christopher L., Ph.D., Princeton U. Assoc. Prof., Earth and Atmospheric Sciences
- Aneshansley, Daniel J., Ph.D., Cornell U. Prof., Biological and Environmental Engineering
- Angent, Largas T., Ph.D., Iowa State U. Assoc. Prof., Biological and Environmental Engineering
- Anton, A. Brad, Ph.D., California Inst. of Technology. Assoc. Prof., Chemical and Biomolecular Engineering
- Apse, Alyssa B., Ph.D., Johns Hopkins U. Clare Boothe Luce Assoc. Professor of Electrical and Computer Engineering
- Aquino, Wilkens, Ph.D., U. of Illinois. Asst. Prof., Civil and Environmental Engineering
- Archer, Lynden A., Ph.D., Stanford U. Marjorie L. Hart '50 Professor of Engineering, Chemical and Biomolecular Engineering
- Arms, William, Ph.D., U. of Sussex (U.K.). Prof., Computer Science
- Ast, Dieter G., Ph.D., Cornell U. Prof., Materials Science and Engineering
- Avedisian, C. Thomas, Ph.D., Princeton U. Prof., Mechanical and Aerospace Engineering
- Avestimehr, A. Salman, Ph.D., U. of California, Berkeley. Asst. Prof., Electrical and Computer Engineering
- Baeumner, Antje J., Ph.D., U. of Stuttgart (Germany). Prof., Biological and Environmental Engineering
- Bailey, Graeme, Ph.D., U. of Birmingham (U.K.). Prof., Computer Science
- Baker, Shefford P., Ph.D., Stanford U. Assoc. Prof., Materials Science and Engineering
- Bala, Kavita, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Computer Science
- Barazangi, Muawia, Ph.D., Columbia U. Prof., Earth and Atmospheric Sciences
- Bartel, Donald L., Ph.D., U. of Iowa. Graduate School Prof. (Emeritus), Mechanical and Aerospace Engineering and Biomedical Engineering
- Bartsch, James A., Ph.D., Purdue U. Assoc. Prof., Biological and Environmental Engineering
- Bassett, William A., Ph.D., Columbia U. Prof. (Emeritus), Earth and Atmospheric Sciences
- Bhave, Sunil, Ph.D., U. of California, Berkeley. Asst. Prof., Electrical and Computer Engineering
- Bindel, David, Ph.D., U. of California, Berkeley. Asst. Prof., Computer Science
- Bird, John M., Ph.D., Rensselaer Polytechnic Inst. Prof. (Emeritus), Earth and Atmospheric Sciences
- Birman, Kenneth P., Ph.D., U. of California, Berkeley. N. Rama Rao Professor of Computer Science
- Bisogni, James J., Ph.D., Cornell U. Assoc. Prof., Civil and Environmental Engineering
- Blakely, John M., Ph.D., Glasgow U. (U.K.). Herbert Fisk Johnson Professor of Engineering, Materials Science and Engineering
- Bland, Robert G., Ph.D., Cornell U. Prof., Operations Research and Information Engineering
- Bloom, Arthur L., Ph.D., Yale U. Prof. (Emeritus), Earth and Atmospheric Sciences
- Bojanczyk, Adam W., Ph.D., U. of Warsaw (Poland). Assoc. Prof., Electrical and Computer Engineering
- Bonassar, Lawrence J., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Biomedical Engineering and Mechanical and Aerospace Engineering
- Booker, John F., Ph.D., Cornell U. Graduate School Prof. (Emeritus), Mechanical and Aerospace Engineering
- Brock, Joel D., Ph.D., Massachusetts Inst. of Technology. Prof., Applied and Engineering Physics
- Brown, Larry D., Ph.D., Cornell U. Prof., Earth and Atmospheric Sciences
- Brutsaert, Wilfried H., Ph.D., U. of California, Davis. William L. Lewis Prof. of Engineering, Civil and Environmental Engineering
- Buhrman, Robert A., Ph.D., Cornell U. John Edson Sweet Professor of Engineering, Applied and Engineering Physics
- Burns, Joseph A., Ph.D., Cornell U. Irving Porter Church Professor of Engineering, Theoretical and Applied Mechanics; Astronomy
- Butcher, Jonathan, T., Ph.D., Georgia Inst. of Technology. Asst. Prof., Biomedical Engineering
- Cady, K. Bingham, Ph.D., Massachusetts Inst. of Technology. Prof., Theoretical and Applied Mechanics; Nuclear Science and Engineering
- Callister, John R., Ph.D., Cornell U. Kinzelberg Director of Entrepreneurship in Engineering, Mechanical and Aerospace Engineering
- Campbell, Mark E., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Mechanical and Aerospace Engineering
- Cardie, Claire T., Ph.D. U. of Massachusetts, Amherst. Prof., Computer Science
- Carr, Paul G., Ph.D., Virginia Polytechnical Institute. Adj. Assoc. Prof., Civil and Environmental Engineering
- Cathles, Lawrence M. III, Ph.D., Princeton U. Prof., Earth and Atmospheric Sciences
- Caughey, David A., Ph.D., Princeton U. Prof., Mechanical and Aerospace Engineering
- Chen, Tsuhan, Ph.D., California Inst. of Technology. Prof., Electrical and Computer Engineering
- Chiang, Hsiao-Dong, Ph.D., U. of California, Berkeley. Prof., Electrical and Computer Engineering
- Cisne, John L., Ph.D., U. of Chicago. Prof., Earth and Atmospheric Sciences
- Clancy, Paulette, Ph.D., Oxford U. (U.K.). Prof., Chemical and Biomolecular Engineering
- Cohen, Claude, Ph.D., Princeton U. Prof., Chemical and Biomolecular Engineering
- Collins, Lance R., Ph.D., U. of Pennsylvania. Prof., Mechanical and Aerospace Engineering
- Colucci, Stephen J., Ph.D., SUNY Albany. Prof., Earth and Atmospheric Sciences
- Constable, Robert L., Ph.D., U. of Wisconsin. Prof., Computer Science
- Cooke, J. Robert, Ph.D., North Carolina State U. Prof. (Emeritus), Biological and Environmental Engineering
- Cool, Terrill A., Ph.D., California Inst. of Technology. Prof., Applied and Engineering Physics
- Cowen, E. A., Ph.D., Stanford U. Assoc. Prof., Civil and Environmental Engineering
- Craighead, Harold G., Ph.D., Cornell U. Charles W. Lake Jr., Prof. of Engineering, Applied and Engineering Physics
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2. have adequate preparation for graduate work in the chosen field of study;
3. have fluent command of the English language;
4. present evidence of promise in advanced study and research; and
5. take the Graduate Record Examinations (GRE) General Test or other specific examinations required by the various fields of study.

Additionally, international applicants whose native language is not English must provide proof of competency in English as part of the admissions process. Proof can be:

1. the following minimum scores on the Test of English as a Foreign Language (TOEFL): writing, 20; listening, 15; reading, 20; and speaking, 22. Individual fields of study may set higher minimums.

or

2. evidence of at least two years of study in a college or university in a country where English is both the native language and the language of instruction.

Information about the TOEFL exam and the GRE—including examination times, dates, locations, and application forms—is available online from the Educational Testing Service (www.ets.org) or by postal mail at ETS, Princeton, NJ 08541, U.S.A.

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INQUIRIES

Applicants should contact the fields of study for answers to specific questions about admission to their graduate programs. Contacts in the fields of study also can answer questions about facilities for advanced study and research, special requirements, and opportunities for fellowships and assistantships. Phone numbers, e-mail addresses, and other contact information are available online at catalog.gradschool.cornell.edu.

General questions about graduate study can be directed to Graduate School Student Services, 255-5820, or gradschool@cornell.edu or www.gradschool.cornell.edu or by writing to Graduate School, 143 Caldwell Hall, Cornell University, Ithaca, NY 14853-2602.

FOR MORE INFORMATION

Detailed information about the admissions process, academic programs, financial aid, and student services is available at the Graduate School web site, www.gradschool.cornell.edu. The site features links to the Graduate School's online application (apply.gradschool.cornell.edu), printable forms, and links to sites of interest to graduate applicants.

SCHOOL OF HOTEL ADMINISTRATION

ADMINISTRATION

Michael D. Johnson, dean, E. M. Statler Professor

Steven A. Carvell, associate dean for academic affairs

David Strong, associate dean for business affairs

Jon Denison, associate dean for external affairs

Judi Brownell, dean of students

Joe Strodel, director of corporate affairs

Tom Ward, director of the Leland C. and Mary M. Pillsbury Institute for Hospitality Entrepreneurship

Timothy Hinkin, Richard J. and Monene P. Bradley Director for Graduate Studies

Lisa M. Shaffer, director of student services

Brad Walp, director of enrollment management and international programs

Molly deRoos, associate director of career management

Meg Keilbach, interim director of alumni affairs and development

Christine Natsios, director of alumni affairs

Emily Franco, director of Hotel School/Culinary Institute of America Alliance

Timothy J. Durnford, director of information technologies

Dina Kristof, registrar

DEGREE PROGRAMS

Hotel Administration

Degree

B.S.
M.M.H.
M.S.
Ph.D.

FACILITIES

Statler Hall Statler Hall is a unique building designed explicitly to meet the needs of the faculty and students of the School of Hotel Administration. The building serves both practical and theoretical instruction, among its classrooms, lecture rooms, laboratories, library, computer center, beverage management center, newly refurbished auditorium, and the Statler Hotel and J. Willard Marriott Executive Education Center. Statler Hall and the Statler Hotel were designed explicitly for the school's academic and executive education programs, providing students with training and work experience in facilities similar to those in which they will work after graduation. In the fall of 2004, the school opened the Robert A. and Jan M. Beck Center, a 35,000-square-foot addition to Statler Hall. This \$16.2 million expansion provides state-of-the-art classroom and meeting spaces, a computer laboratory, and

teaching technologies that facilitate an interactive teaching style.

The School of Hotel Administration's Nestlé Library The Nestlé Library has one of the best collections of hospitality-related materials in the United States. The collection contains approximately 37,000 books, 1,500 videotapes, and more than 600 journal, magazine, newsletter, and newspaper subscriptions. Materials on lodging, foodservice, travel and tourism, real estate, and general hospitality business topics comprise the core of the library's collections. Among the library's special features are numerous electronic information resources, including *Business Source Premier*, *Proquest*, *Hotel Outlook*, *Mintel Marketing Intelligence*, and the *Hospitality and Tourism Complete*, a unique index of hospitality articles. Information resources and services for the hospitality industry are available for a fee through the library's HOSTLINE service. More detailed information about the Nestlé Library can be found at www.nestlelib.cornell.edu. In addition to offering an excellent collection of materials and access to extensive electronic resources, the Hotel School library provides instruction and research support to every student.

Statler Hotel and J. Willard Marriott Executive Education Center The Statler Hotel comprises 153 guest rooms; an executive education center; a signature restaurant, Taverna Banfi; two quick-service food outlets; a lounge; and the university's faculty and staff club. The Statler Hotel is an independent, self-sustaining teaching unit that provides quality food and beverage, meeting, and lodging services to the local community and to campus visitors, such as parents and those who visit Cornell as part of the application process. The Statler Hotel provides a unique brand of hospitality that integrates the management theory taught at the Cornell Hotel School with practical expertise of the hotel's professional and student staff. The hotel offers part-time jobs to approximately 200 students each semester with priority given to students in the Hotel School. A select group of students participate in the Statler Leadership Development program and earn supervisory and management positions in the hotel.

UNDERGRADUATE CURRICULUM

The School of Hotel Administration offers education in the numerous disciplines required for modern management in the global hospitality industry. Included in the core curriculum are courses in operations, management and organizational behavior, human resource management, finance/accounting, real estate development, food and beverage management, marketing, tourism, strategy, facilities management planning and design, communication, information systems, and law. Students also are encouraged to pursue a broad range of elective courses

among the humanities, social sciences, and natural sciences as preparation for assuming leadership positions in the business and local community. For more complete information about undergraduate program requirements, see the Hotel School's *Student Handbook* (available in the Office of Student Services, 180 Statler Hall).

Requirements for Graduation

Regularly enrolled undergraduate students in the School of Hotel Administration are candidates for the degree of bachelor of science. The requirements for that degree are:

1. completion of eight semesters in residence for those who entered as freshmen; semesters of residence for transfer students are determined by the amount of transfer credit awarded;
2. completion, with a minimum cumulative grade point average (GPA) of 2.0 (including a GPA of 2.0 in a full-time schedule of courses on campus in the final semester), of 120 required and elective credits (note: 120 credits does not include PE courses), as set forth in the table on the following page;
3. qualification in one language other than English. This requirement may be met by any one of the following: (a) three years of high school study of one foreign language; (b) score of 560 on Cornell Placement Test; (c) passing language course level 1210 and 1220 (8 credits) or the equivalent, and attaining a minimum grade of at least C- or "Satisfactory" in each (C or above for transfer credit from other institutions); or (d) passing language course level 1230 or the equivalent;
4. completion of two units of practice credit; and
5. completion of the university requirement in physical education (including the swim test).

Suggested course programs appear on the following pages. The core courses account for 69 of the 120 credits needed for graduation, the Hotel School electives account for 12 credits, and 18 credits are allotted for distributive electives. The remaining 21 credits may be earned in courses chosen from the offerings of any college of the university, provided that the customary requirements for admission to such courses are met.

Students in the School of Hotel Administration who plan to attend summer school at Cornell or any other four-year college or university, with the expectation that the credit earned will be counted toward the Cornell degree in hotel administration, must obtain the approval from the school in advance. Without advance approval, such credit may not count toward the degree.

Credit earned in military science, aerospace studies, or naval science courses may be counted in the 21-credit group of free electives.

Transfer Credit Policy

Transfer students are required to complete all degree requirements with at least 60 credits at Cornell University. In the core, transfer credit may be allowed against basic courses only (e.g., HADM 1121, 1106). The communication courses (HADM 1165 and 3365) are tailored specifically to the School of Hotel Administration and, thus, communication courses taken elsewhere generally are not a replacement for core courses.

Hotel elective courses may not be transferred, except from the Culinary Institute of America. Eighteen credits in distributive electives may be transferred, and 21 credits in free electives may be transferred.

Minor in Real Estate

The minor in Real Estate is designed to prepare students for careers in the commercial real estate industry. Both the U.S. and international capital markets are undergoing fundamental changes, as is the nature of real estate ownership. This minor focuses on careers as a real estate investor, in real estate finance, in real estate consulting, in structured finance, and in real estate transaction support. Cornell University's Hotel School is at the forefront of knowledge in this field and will help students prepare for a rewarding career. The minor is fulfilled with a minimum of six courses. Four courses are required and two or more electives complete the minor. A minimum of 18 credit hours is required to complete the minor. Any undergraduate student in the university may enroll in the minor in Real Estate; the minor is designed to integrate with the requirements of several majors including AEM in CALS, ORIE in Engineering, Industrial and Labor Relations, and Economics in Arts and Sciences.

Requirements for students in the School of Hotel Administration are different from requirements for students in other undergraduate units. Students who wish to pursue a minor in Real Estate must complete and submit an application. Applications are available in the home of the minor in Real Estate, 465 Statler Hall, on the school's web site, or by e-mailing cu_re_minor@cornell.edu.

Minors

Students in the School of Hotel Administration may pursue minors offered by units in any college or division. A unit that offers a minor may place restrictions on who can pursue that minor (usually because of limited resources), and a major may place restrictions on the minors that its students can take (usually because the major and minor areas are too similar).

Completion of a minor will be audited by the unit that offers it. The minor will be recorded on students' official transcripts by their home colleges after receiving verification by the unit offering the minor, usually during the summer after graduation. Students should inquire with the offering units for application procedures and requirements.

Concentration

While completing the Hotel School elective courses, undergraduates in the school may select a concentration.

Before selecting a field of concentration, students should consult the coordinator of instruction in that area during their

sophomore year to plan the sequence of courses that will best fit their program.

Upon completion, the concentration will be noted on the transcript, provided a cumulative GPA of 3.0 in the concentration was attained.

Foreign Languages

Mastery of a foreign language is particularly desirable for students who are planning careers in the hospitality industry and, hence, there is a second-language requirement for graduation. Further information on foreign language courses at Cornell, and placement in language courses, may be found under "Modern Languages, Literature, and Linguistics" and under "Advanced Placement for Freshmen" in the College of Arts and Sciences section of this catalog.

Independent Study and Research

Students may conduct independent studies or research projects in any academic area of the school under the direction of a resident faculty member. Credit is arranged on an individual basis. To enroll in an independent study or research project, students must obtain written permission from the school before the add deadline. See HADM 4497, 4498, 4499, 6698, or 6699 for more details.

Practice Credit Requirement

As part of the degree requirements, undergraduates enrolled in the School of Hotel Administration must fulfill the practice credit requirement and submit verification thereof. Further details are set forth in the *Student Handbook for Undergraduates in the School of Hotel Administration* (available in the Office of Student Services, 180 Statler Hall).

Management-Intern Program

Hotel school juniors and seniors have a unique opportunity to gain invaluable knowledge and experience in the hospitality industry through the Management-Intern Program (MIP). Students receive 12 free elective credits and 1 practice credit. While on the internship, tuition is reduced and students may receive a salary from the sponsoring organization. Positions are available in the United States and internationally. Application should be completed one semester in advance. Information meetings are held at the beginning of each semester and are open to all students. See HADM 4493, 4494, and the student handbook for more details about the Management-Intern Program (available in the Office of Student Services, 180 Statler Hall).

Study Abroad

All students planning to study abroad must apply through Cornell Abroad; please see the Cornell Abroad program description in the introductory section of this catalog.

The Hotel School represents the international aspects of the hospitality industry in many ways—from the large number of international students in its program to career opportunities throughout the world. To prepare for the global nature of the industry, students are encouraged to consider studying abroad in either the fall or spring semesters of their junior year (or, in some cases, both). While abroad, students have the opportunity to learn

about other cultures, to become more proficient in a second (or perhaps third) language and, in those programs where internships are offered, to work in an international environment.

Students should start the investigation process early, including a consultation with the Hotel School study abroad advisor, 180 Statler Hall, as well as with the staff in the Cornell Abroad office, 300 Caldwell Hall. Requirements for college approval include a GPA of 3.0 or higher, good academic standing, registered full-time student status, and not being in one's final semester. Credits earned abroad are considered transfer credits, and, as such, they count against the maximum of 60 transfer credits allowed. A maximum of 15 credits may be transferred from study abroad programs, and students should plan on taking no less than 15 credits while abroad. Courses typically transfer into distributive and free electives. Credit for study abroad programs will be awarded only after successful completion (marks equivalent to a Cornell grade of C or higher) of the semester abroad and receipt of the official transcript by the college.

For further details on the application process and deadlines, see the "Cornell Abroad" section of this catalog or view the Cornell Abroad web site at www.cuabroad.cornell.edu.

Culinary Institute of America Alliance

The School of Hotel Administration has an alliance with the Culinary Institute of America (CIA), which is located in Hyde Park, N.Y. Hotel School juniors and seniors can both earn their B.S. from Cornell and complete the requirements for an Associates in Occupational Studies (A.O.S.) degree in Culinary Arts from the CIA during the course of their four-year program at Cornell. Most students apply to the program during their sophomore year, so planning should start early to be sure all program requirements are met.

Students study approximately nine months onsite at the CIA, working and learning daily in the finest training kitchens in the world. Students are required to have completed HADM 2236 Culinary Theory and Practice and HADM 3305 Restaurant Management from the Hotel School core curriculum before attending the full program at the CIA. In addition to the core curriculum, Hotel School students are required to take four specific courses to complete the degree requirement:

- HADM 4403 Specialty Food and Beverage Operations: Guest Chefs (offered spring only)
- HADM 4404 Catering and Special Events Management (offered fall only)
- HADM 4430 Introduction to Wines
- HADM 4432 Contemporary Healthy Foods (offered fall only)

More information about the CIA is available at www.ciachef.edu. Frequently asked questions are available at www.hotelschool.cornell.edu/academics/special/cia/ciasha.html. For additional collaborative degree program questions or to obtain applications, contact CIA_Alliance@cornell.edu.

Part-Time Study

Generally, part-time study is not allowed. Exceptions may be made for employee

degree candidates, students who have medical reasons for a reduced schedule, or in other very extenuating circumstances. In no event shall a student be allowed to enroll on a part-time basis during the last semester of study. Further details on part-time study may be found in the school's student handbook (available in the Office of Student Services, 180 Statler Hall).

Grading System

Letter grades ranging from A+ to F are given to indicate academic performance in each course. These letter grades are assigned a numerical value for each semester average as follows: A is equivalent to 4.0; B to 3.0; C to 2.0; D to 1.0; and F to 0. For good standing, a student must maintain a minimum average of 2.0. A maximum of 4 credits each semester may be taken on a "satisfactory-unsatisfactory" (S-U) basis. Students should be aware that a satisfactory grade is equivalent to a C- or above and an unsatisfactory grade is equivalent to a D+ or lower.

Students whose semester averages are at least 3.3 and who have taken at least 12 credits of letter grades with no unsatisfactory or incomplete grades are honored by being placed on the Dean's List.

Course Requirements for the Bachelor of Science Degree

<i>Required courses</i>	<i>Credits</i>
Operations: HADM 1105, 1106, 2201, 3301, 3305	14
Management and Organizational Behavior: HADM 1115	3
Human Resource Management: HADM 2211	3
Finance/Accounting: HADM 1121, 2221, 2222, 3321	12
Food and Beverage Management: HADM 2236	4
Marketing, Tourism, and Strategy: HADM 2243, 4441	6
Facilities Management, Planning, and Design: HADM 2255, 3355	6
Managerial Communication: HADM 1165, 3365, first-year writing seminar	9
Information Systems: HADM 1174, 2275	6
Law: HADM 3387	3
Economics: HADM 1141	3
<i>Specifically required credits</i>	69
<i>Hotel electives</i>	12
<i>Distributive electives</i>	18
<i>Free electives</i>	21
Total credits required for graduation	120

Typical Course Sequences

The following arrangements of courses tend to be more fixed during freshman and sophomore years, with a greater degree of flexibility characterizing the upper-class years.

Freshman Year

Typically, a freshman schedule will consist of 15 to 16 credits each semester, to include the following:

<i>Required courses</i>	<i>Credits</i>
HADM 1105 Introduction to Hotel Operations	2
HADM 1106 Introduction to Food Service Operations	2
HADM 1115 Organizational Behavior and Interpersonal Skills	3
HADM 1121 Financial Accounting	3
HADM 1141 Microeconomics for the Service Industries	3
HADM 1165 Managerial Communication I	3
HADM 1174 Microcomputing	3
First-year writing seminar	3
Electives	6
	<hr/> 28

Sophomore Year

<i>Required courses</i>	<i>Credits</i>
HADM 2201 Hospitality Quantitative Analysis	3
HADM 2211 Human Resource Management	3
HADM 2221 Managerial Accounting	3
HADM 2222 Finance	3
HADM 2236 Culinary Theory and Practice	4
HADM 2243 Principles of Marketing	3
HADM 2255 Hotel Development and Planning	3
HADM 2275 Introduction to Information Systems Management	3
Electives	6
	<hr/> 31

Junior Year

<i>Required courses</i>	<i>Credits</i>
HADM 3301 Service Operations Management	3
HADM 3305 Restaurant Management	4
HADM 3321 Hospitality Financial Management	3
HADM 3355 Hospitality Facilities Operations	3
HADM 3365 Managerial Communication II	3
HADM 3387 Business and Hospitality Law	3
Electives	12
	<hr/> 31

Senior Year

<i>Required courses</i>	<i>Credits</i>
HADM 4441 Strategic Management	3
Electives	27
	<hr/> 30

GRADUATE CURRICULUM

The school's programs for advanced degrees include those of Master of Management in Hospitality, Master of Science, and Doctor of Philosophy. For further information on graduate programs, contact the Office of Student Services, 180 Statler Hall, 255-6376.

Required Program for Master of Management in Hospitality Degree

<i>Required courses</i>	<i>Credits</i>
HADM 6610 Dean's Distinguished Lecture Series	1
HADM 7703 Operations Management	3
HADM 7711 Organizational Behavior	3
HADM 7712 Human Resources Management	3
HADM 7723 Corporate Finance	3
HADM 7724 Managerial Accounting	3
HADM 7743 Hospitality Marketing	3
HADM 7744 Competitive Strategies for the Hospitality Industry	3
HADM 7751 Property Development and Planning	3
HADM 7761 Managerial Communication	3
HADM 7772 Information Systems Management	3
HADM 7796 Charrette	1
HADM 7797 Hospitality Industry Leadership Development Program	1
Balance of courses is electives.	
Total credits required for the master of management in hospitality program	<hr/> 48

Course Schedule Information

For up-to-date information about course scheduling, and to obtain a course supplement, contact the Office of Student Services, 180 Statler Hall, 255-6376.

ORGANIZATIONAL MANAGEMENT, COMMUNICATION, AND LAW

Management and Organizational Behavior

HADM 1110 Distinguished Lectures in Hospitality Management

Fall. 1 credit. Elective. Those wishing to enroll have until Friday, Sept. 4, 2009, to add it. Dean M. Johnson.

The Dean's Distinguished Lecture Series is a long-standing Hotel School tradition that provides a unique opportunity for successful industry leaders to share their experiences with Cornell students. In its 40-year history, the Dean's Distinguished Lecture Series has hosted the most influential and accomplished leaders from every segment of the hospitality industry. Speakers share their views about successful management styles, possible career paths, critical industry-related issues, and qualities conducive to successful business leadership. Students have an unparalleled opportunity to learn and question how hospitality leaders view the current and future status of the industry.

HADM 1115 Organizational Behavior and Interpersonal Skills

Fall and spring. 3 credits. Required.
T. Hinkin, K. Walsh, J. Brownell, and T. Simons.

This course focuses on how to manage people in the workplace. Students develop theoretic lenses for understanding people and organizations, as well as practical tools for accomplishing personal and organizational goals. Topics include individual differences, conflict management, problem-solving, power and influence, motivation, leadership, coaching and counseling, and group process. Students learn through the use of case studies, self-assessments, experiential exercises, readings, discussions, papers, and group activities.

HADM 2217 Statler Leadership Development Program

Fall. 1 credit. Elective. Prerequisite: one semester (200 hours) of employment at the Statler Hotel. T. Hinkin.

The SLDP is a partnership among Hotel School faculty and Statler Hotel management, who together teach and guide students how to become tomorrow's leaders. The program enables students to progress through five different paid employment phases at the Statler Hotel, from entry level to student manager. Students who progress to the level of student manager become Statler Fellows and will travel to a major city for an all-expense-paid trip that includes forums with industry leaders, site visits of leading industry facilities, and cultural activities. Each phase requires approximately 200 hours of paid employment at the Statler Hotel and is completed through a certification process.

HADM 4410 Hospitality Management Seminar

Fall. 1 credit. Elective. Limited to 30 Hotel seniors. Corequisite: HADM 1110. Preregistered students or students wishing to add course who do not attend first class and who fail to notify secretary in 146 Statler Hall of their absence before first class automatically will be moved to instructor's waiting list. Students permitted to take course will have until F, Sept. 5, 2010, to add it. Failure to do so will result in their being dropped from course. Dean M. Johnson.

HADM 4410 complements HADM 1110 by giving students the opportunity to interact with guest speakers and to participate in roundtable discussions on issues relating to the hospitality industry. Students will have the opportunity to gain a better understanding of industry trends, challenges, and opportunities.

HADM 4411 Negotiations in the Hospitality Industry

Spring. 3 credits. Elective. Limited to 30 students. Prerequisite: undergraduate standing; HADM 1115 or equivalent. Grad students enroll in HADM 6611. T. Simons.

Negotiation is a critical factor in business success. This course provides hands-on experience in negotiation in the hospitality context. Through the use of role-play exercises, discussions, and writing exercises, students develop into tough negotiators with whom people will want to continue doing business. Students become more comfortable with negotiations and develop their own personal negotiating style. Students also learn how to adjust their negotiating style to

respond appropriately to others' different personalities and negotiation tactics.

HADM 4415 Managerial Leadership in the 21st Century

Spring. 1 credit. Elective. Due to popularity of class, priority is given in following order: seniors/second-semester grads, juniors/first-semester grads, nonemployees, extramural students, sophomores, freshmen, and Cornell employees. Space permitting, class may be added up until first day, **but absolute deadline for dropping course is 12 noon F, Feb. 26**. F, Mar. 5 (1–6 P.M.), S, Mar. 6 (10 A.M.–6 P.M.), Sun, Mar. 7 (10 A.M.–4:30 P.M.), 2010, in Statler Auditorium. Attendance mandatory for credit. Fee for required notebook (charged to student's bursar bill; notebook distributed on first day of class): \$45. K. Blanchard.

Managerial Leadership in the 21st Century helps students become participant observers in their own lives through studying the field of applied behavioral science. Students will be able to use what they learn about human beings and how they function best in groups and organizations on a day-to-day basis to develop high-quality relationships between themselves and the people they support and depend upon (their boss, staff, peers/associates, and customers). When quality relationships exist, organizations tend to be characterized by high levels of integrity, customer satisfaction, employee empowerment, and organizational effectiveness. The concepts learned also help students create quality friendships and family relationships. A final paper is due three weeks after the last day of class.

HADM 4417 Hospitality Leadership

Spring, second seven weeks of semester. 2 credits. Limited to Hotel seniors; Hotel juniors by permission. Prerequisite: HADM 1115 or similar course.

Being an effective leader is one of the fundamental responsibilities of almost all hospitality managers and also plays a critical role in managing organizational change. In this course, you will learn about your leadership style, explore a range of effective and ineffective leader behaviors, understand the importance of both formal and informal leadership, and develop your leadership skills. Instructional techniques will include self-assessment, lecture and discussion, case analyses, and experiential exercises. Course is strongly recommended for SLDP seniors.

HADM 5511 Survey of International Management

Fall. 3 credits. Elective. J. Katz.

This course provides an overview of management in the international environment, both within multinational corporations and in domestic corporations based outside of the United States. The goal is to teach students how to be more effective when working in global contexts: how to analyze and respond to behavioral differences across countries; methods to communicate effectively in cross-cultural and multicultural settings; leading multinational teams, etc. The course is taught with a combination of lectures, cases, and in-class exercises.

HADM 6610 M.M.H. Discussion Forums in Hospitality Management

Fall. 1 credit. Required. M.M.H. students only. M. Johnson.

HADM 6610 is a required master's-level course that provides a unique opportunity for

successful industry leaders to share their experiences with M.M.H. students in a small group setting. Speakers will share their views about the successful skill sets, temperaments, and leadership styles needed to be an effective and valuable executive. They will also focus on critical industry-related issues. The speakers are chosen for their knowledge, experience, and proven success in the hospitality industry. As a student in HADM 6610, you will have an unparalleled opportunity to learn how hospitality executives view the current and future status of the industry.

HADM 6611 Negotiations in the Hospitality Industry

Spring. 3 credits. Elective. Limited to 30 students. Prerequisite: graduate standing. Undergraduates to enroll in HADM 4411. T. Simons.

Negotiation is a critical factor in business success. This course provides hands-on experience in negotiation in the hospitality context. Through the use of role-plays, discussions, and writing exercises, students develop into tough negotiators with whom people will want to continue doing business. Students become more comfortable with negotiations and develop their own personal negotiating style. Students also learn how to adjust their negotiating style to respond appropriately to others' personalities and negotiation tactics.

HADM 7711 Organizational Behavior

Fall. 3 credits. M.M.H. requirement. Prerequisite: M.M.H. students or written permission of instructor in advance of preenrollment. T. Hinkin.

Organizational Behavior teaches how individuals, groups, and organizations interact within a complex, globalized service environment. Students develop interpersonal skills and gain a greater awareness of how their personal styles influence leadership and decision-making. They learn to motivate others, negotiate ethical decisions, manage teams, and lead organizations through change.

Human Resource Management**HADM 2210 The Management of Human Resources**

Fall. 3 credits. Elective. Prerequisite: non-Hotel students. Not open to freshmen. S. Way.

Students engage in a practically oriented examination of the role of human resources management (HRM), starting with an introduction to the HR function and an analysis of the social, legal, international, and competitive factors influencing HRM. The course examines recruitment, selection, training, motivation, development, compensation, performance appraisal, and labor relations. The course assumes a managerial perspective and emphasizes class discussion and case analysis.

HADM 2211 Human Resource Management

Fall, spring. 3 credits. Required. Limited to 70 students per lec. Not open to freshmen or graduate students. Prerequisite: HADM 1115. B. Tracey, S. Way, and M. Sturman.

This course facilitates an understanding of the policies, procedures, and systems required to attract, select, develop, and retain quality employees. Students learn about the major environmental factors that affect the

HR function, including legislation, economics, and demographics. The course emphasizes human resource issues in the hospitality industry. Instruction is based on lecture and discussion as well as case analysis and project work.

HADM 3313 Training and Development

Fall. 3 credits. Elective. Not open to freshmen. B. Tracey.

Training is one of the fundamental responsibilities of almost all hospitality managers, and this HR function plays an instrumental role in managing organizational change. In this course, students will learn how to design, implement, and evaluate both formal and informal training programs. In addition, we will examine factors beyond design and implementation that may influence training effectiveness. A variety of instructional techniques will be used throughout the course, including experiential activities that will enliven the learning process. The course will also include the opportunity to conduct a "live case study" of one or more training problems with a real hospitality firm.

HADM 5512 Managing Compensation

Spring. 3 credits. Elective. Prerequisite: introductory human resource course (HADM 2211, HADM 7712, ILR 2600, ILRHR 5600, or equivalent). M. Sturman.

This course is designed to give students a practical understanding of the methods and implications of compensation, including hands-on experience designing compensation systems for firms in the service industry. (The course is designed to provide material that is distinct from that provided in ILRHR 6690 Managing Compensation.) Students will learn how to design a pay plan, including base pay and pay-for-performance plans. By the completion of the course, participants will know how to design pay ranges and grades for organizations where most jobs can be benchmarked with market data. The course will also devote considerable time to the design of incentive plans, including merit pay, bonuses, gainsharing, profit sharing, piece-rate, tipping, and commission systems. The course is designed to be useful for those desiring employment as an entry-level compensation specialist, a human resources generalist, those starting and running their own business, or those who want a better understanding of how human resource practices are actually managed. For students with a particular interest in compensation, the course can be taken in addition to the ILRHR 6690 course; for those interested in compensation in the services industry, this course can be taken as a standalone course.

HADM 5513 Strategic Human-Resource Management in Hospitality

Spring. 3 credits. Elective. Prerequisite: HADM 2211 or equivalent. B. Tracey.

Over the past several years, the HR function has taken on a broader role in helping organizations to create and sustain a competitive advantage. The primary focus of this course is to examine the ways in which HR policies, practices, and systems can enhance the competitive capabilities of hospitality organizations. This seminar-style course will be conducted using hospitality case studies and current business problems as a basis for learning. The course will also include the opportunity to conduct a "live case study" of one or more strategic HRM problems with a real hospitality firm.

HADM 7712 Human-Resource Management

Spring. 3 credits. M.M.H. requirement. Prerequisite: M.M.H. students or written permission of instructor in advance of preenrollment. M. Sturman.

This graduate-level course covers the strategies that enable companies to attract, develop, and retain high-quality employees, which include selection, compensation, performance appraisal, and career management. In each of these areas, the focus is on the return on the human-resource investment.

Managerial Communication

HADM 1165 Managerial Communication I

Fall, spring. 3 credits. Required. Limited to 18 students per lec. (Students who are required to take this course generally may not delay it. If extenuating circumstances exist, student must petition to drop course by end of first week of classes. Course must be taken within first two semesters in the Hotel School, including any semesters in Internal Transfer Division (ITD). Add/drop and section exchange must be approved by chairperson.) Priority given to Hotel students.

D. Jameson, A. Newman, and C. Snow.

This course provides an introduction to the role and importance of effective communication in managerial work, especially in the hospitality industry. Students develop abilities in analytical thinking and clear expression. Students will engage in the process of planning, preparing, and executing professional communications with an emphasis on written documents. Students write a series of business documents and give oral presentations.

HADM 3364 Corporate Communication

Spring. 3 credits. Elective. Limited to 30 students per lec; priority given to Hotel students. Prerequisite: junior, senior, or graduate standing or written permission of instructor; for Hotel undergraduates, HADM 1165 or waiver; for non-Hotel undergraduates, completion of their college's writing requirement. A. Newman.

How you communicate as a leader will determine your ability to convey ideas, manage teams, win support—and get promoted within an organization. In this course, we'll analyze how companies handle crisis communication, work with the media, manage change, and inspire employees. With an emphasis on current events, we'll study both traditional communication methods and new communication technologies, such as blogging, intranets, e-mail, web meetings, and instant messaging. Expect written assignments and highly interactive presentations to build your communication skills.

HADM 3365 Managerial Communication II

Fall, spring. 3 credits. Required. Limited to 24 students per lec; priority given to Hotel students. Prerequisites: junior or senior standing; for Hotel undergraduates, HADM 1165 and 1115. D. Lennox and A. Newman.

This course develops the knowledge and skills hospitality managers need to face an array of persuasive communication challenges. HADM 3365 builds on the principles of effective managerial communication presented in HADM 1165 as well as the concepts of organizational

behavior and interpersonal skills covered in HADM 1115. The course introduces the theory and principles of persuasion and focuses on their application in a range of management and leadership contexts.

HADM 4462 Intercultural Communication in the Hospitality Industry

Spring. 3 credits. Elective. Priority given to Hotel students. D. Lennox.

This course is designed to help managers develop proficiency when communicating among and between people who do not share similar cultural assumptions. Students can expect to learn communication variables that differ among cultural groups, including the use of eye contact, body language, personal space, hierarchy, and time. Additional topics include persuasion and negotiation across cultures and the ethics of communication in international business. Students learn through the use of a blend of theory and practice. Activities include lectures, guided discussions, group projects, student and guest speaker presentations, and analysis of specific cross-cultural managerial challenges, with an emphasis on the service industry.

HADM 7761 M.M.H. Managerial Communication

Fall. 3 credits. Required. Limited to 40 M.M.H. students per sec. D. Lennox.

Managers use communication strategies that involve written and oral messages to solve problems and to accomplish professional goals within the workplace. The chief goal of this course is to help students become more competent, confident, and versatile communicators. Each student prepares clear and powerful messages—reports, oral presentations, letters, and memos—and learns to approach problems analytically and make thoughtful communication choices, some of which are situation-specific.

Law

HADM 3385 Business Law I

Fall, spring. 3 credits. Elective. Open to Hotel School juniors, seniors, and graduate students and non-Hotel students. P. Wagner.

Provides students with a presentation of three substantive areas of business law: employment law, franchising, and business organizations. Students read judicial opinions; learn to identify issues; and analyze the issues by applying legal principles.

HADM 3387 Business and Hospitality Law

Fall. 3 credits. Required. Prerequisite: junior, senior, or graduate standing. D. Sherwyn.

This course provides students with an integrated presentation of employment discrimination, tort, and contract concepts as they apply to the legal aspects of hospitality management. Students examine relevant federal and state cases and statutes. The overall objective is to enable students to recognize, analyze, and evaluate legal issues for the purpose of making and articulating appropriate decisions in the workplace.

[HADM 4481 Labor Relations in the Hospitality Industry (also ILR 4060)]

Spring. 4 credits. Elective. Prerequisites: HADM 3387 or ILRCB 2010. Next offered 2010–2011. R. Hurd and D. Sherwyn.

This course will focus on the critical labor relations issues facing the hospitality industry. All students will participate in simulated organizing campaigns and contract negotiations. Representatives of management and unions will address the class on key contemporary developments.]

[HADM 4485 Employment Discrimination Law and Union-Management Relations

Spring. 3 credits. Elective. Prerequisites: junior, senior, or graduate standing; HADM 3387 or permission of instructor. Next offered 2010–2011. D. Sherwyn.

This course provides students with an understanding of discrimination laws, a framework for complying with laws, and a method for using the laws to maintain positive employment relations.]

HADM 4487 Real Estate Law

Fall, spring. 3 credits. Elective. Prerequisite: junior, senior, or graduate standing. Recommended: completion of HADM 3387. A. Klausner.

This course provides students with an understanding of the legal issues surrounding the ownership, transfer, and use and development of real estate. Students will learn to recognize and evaluate legal issues in order to inform the decision-making process with respect to real estate, whether as a business executive, an entrepreneur, or in personal life.

HADM 4489 The Law of the Internet and e-Commerce

Fall. 3 credits. Elective. Prerequisite: junior, senior, or graduate standing. A. Klausner.

The computer industry and the Internet have fundamentally changed the world in swift, dramatic fashion. The emergence of global digital networks and digital technologies offer to nearly anyone the ability to access, store, mine, manipulate, and transmit vast amounts of information. At the same time, this revolution in the use of information raises new and often complex legal disputes in areas such as copyright, trademark, privacy, speech, contract formation, jurisdiction, information security, etc. Moreover, the rapidly growing maze of laws directed at the Internet is another thorny obstacle for persons and companies doing business on the web. The purpose of this course is to acquaint students with the legal topics and principles applicable to the Internet, and to help students identify and understand the rapid developments of the law of the Internet by exploring specific problems.

HOSPITALITY FACILITIES AND OPERATIONS

Food and Beverage Management

HADM 2236 Culinary Theory and Practice

Fall, spring. 4 credits. Required. Prerequisite: HADM 1106. Because this course is laboratory-based, students may not drop after first full week of classes; during first week of class, students may drop only with permission of instructor and/or academic dean. Failure to attend first lab may result in administrative drop. R. Spies.

This course introduces the student to food and beverage operations through three major components: fundamental food composition and properties, food products and preparation, and food safety. Students prepare recipes, menus, and production schedules. Students develop the ability to recognize properly prepared foods by preparing, tasting, and evaluating them. They also are involved in a project in which they create menus, develop and standardize recipes, and complete a plan for a dining event. Completion of a five-hour practicum experience in the Statler Hotel back-of-the-house is a required course activity.

HADM 2290 Introduction to Culinary Arts

Fall, spring. 2 credits. Elective. Limited to 28 non-Hotel students; priority given to seniors and graduate students. Preregistered students who do not attend first class are automatically dropped from instructor's record. Absolute drop deadline is F of first week of classes. Fee (includes cost of uniform and uniform cleaning): \$75. G. Norkus.

This course focuses on the study of food groups and their methods of preparation, cooking, and presentation. The course is designed specifically for non-Hotel students who are interested in learning the professional approach to food preparation and service with hands-on practice. Students are involved in food product identification, preparation and service methods, and learning the professional language of food and cooking.

HADM 4430 Introduction to Wines

Fall, spring. 2 credits. Elective. Prerequisite: Hotel juniors and seniors; seniors and graduate students in all other colleges. Hotel students strongly encouraged to enroll in fall semester. Students are exempt from 21-year-old age requirement under Section 65 of New York State law. Preregistered students who do not attend first class and who fail to notify secretary in 274 Statler Hall of their absence before first class are automatically dropped from instructor's records. These students must drop the course officially with their own college. Because of high demand for this course and consumption of a product, the absolute drop deadline in fall for all students is F, Sept. 11, 2009, and drop deadline in spring is F, Jan. 29, 2010. Fee (includes cost of wine glasses and tasting kit): \$30. No auditors. S. Mutkoski.

Students will be introduced to the major wine-producing regions of the world and what consumers need to know to purchase wine at retail outlets and in a restaurant setting. Lecture topics include flavor components in wine; pairing wine and food; responsible drinking; selecting quality and value wine; and wine etiquette. Samples from a variety of countries, regions, and vineyards are evaluated.

HADM 4431 Wine and Food Pairing Principles and Promotion

Fall. 2 credits. Elective. Limited to 20 Hotel juniors, seniors, and graduate students only. Prerequisite: HADM 4430. G. Pezzotti.

This course focuses on the pairing and creative marketing of wine and food. Students develop an understanding of regional and varietal wine styles, how food flavors can

change a wine's flavor, and the promotion of wine and food. Topics include wine and food pairing principles, cuisines and their flavor components, food trends in restaurants and in the home, special event planning, and wine-list development. Students design and present wine and food tastings to industry guests.

HADM 4432 Contemporary Healthy Foods

Fall. 3 credits. Elective. Priority given to 20 seniors and graduate students; others may enroll, space permitting. Prerequisite: HADM 3305 or equivalent. Cost of required field trip: \$75. M. Tabacchi.

This course is designed to build a greater awareness and understanding among nutrition and foodservice professionals of the origins and manifestations of today's health-conscious and educated foodservice patron. Students gain an understanding of the marriage of nutrition and the imaginative, flavorful cuisine demanded by today's consumer. Emphasis is on the use of fresh produce, lean meats, and lack of fabricated diet foods. Creativity and nutrient density of foods served are very important components of menu design in this course. Key topics include the preparation, marketing, merchandising, and selling of healthy menus in the Statler Hotel.

HADM 4435 Selection, Procurement, and Supply Management

Spring, first seven weeks of semester. 2 credits. Elective. Limited to 20 Hotel juniors, seniors, and graduate students or permission of instructor. Add/drop deadline Sept. 5, 2009. R. Spies.

This course deals with contemporary management issues related to procurement activities within the hospitality industry. Focus is on both the food distribution industry and the hospitality industry so that students understand the role the distributor plays in the movement of food and supplies from the producer to the hospitality operator and how the creation of distribution partnerships serves to improve efficiency and reduce costs. Topics include distribution channels and intermediaries in the supply chain; food distributor financial statement analysis; evaluation and selection of suppliers; development of buying strategies; purchase timing and inventory management; the emerging role of the Internet; and e-procurement service providers.

HADM 4436 Beverage Management

Spring. 3 credits. Elective. Prerequisite: Hotel junior, senior, or graduate standing; HADM 4430 (co-registration not allowed). S. Mutkoski.

This course is designed for students who intend to pursue a career in food and beverage management. Course work deals specifically with the management of beverage operations. Lectures include dram shop liability; staff training and responsible customer service; beverage pricing; food and wine pairings; wine list development; purchasing, storage, and service; wine regions; cost controls and loss prevention; and creative beverage merchandising. Guest lectures highlight industry trends and outlooks.

HADM 4437 Anheuser Busch Seminar in Quality Brewing and Fine Beer

Fall, spring, first seven weeks of semester. 2 credits. Elective. Prerequisite: Hotel students only; HADM 4430. One required local field trip (no fee). G. Pezzotti.

This course is designed for upper-level students who intend to pursue a career in the food and beverage industry. Students will advance their knowledge about beers in terms of managing such products in a restaurant setting or other foodservice outlet. Lecture topics include the brewing process; sensory aspects of beer; international beer types and styles; marketing malt products; purchasing and distribution; storage and service; beer and food pairings; staff training and education; cost controls; and third-party liability issues.

HADM 4438 Seminar in Culture and Cuisine

Spring. 3 credits. Elective. Limited to 20 students. Prerequisite: HADM 2236 or permission of instructor. R. Spies.

This seminar explores various cuisines in terms of history, lifestyle, and foods peculiar to a culture. Through the use of readings, research, and meal preparation, students explore various cuisines in depth. The goal of this course is for students to develop an awareness of several international cuisines and to make comparisons and draw relationships among foodways of different cultures. Possible incorporation of each cuisine into restaurant menus is discussed as well. Students write research reports, make oral presentations, and design and orchestrate the preparation of menus.

HADM 4495 Implementing Strategies for Tying Wellness Practices to Company Profit

Spring. 3 credits. Elective. M. Tabacchi.

There is increasing evidence linking job-induced stress to overall health and happiness or lack thereof. Adding to workplace stress are the needs of its diverse and changing population. These stresses affect the financial health of the corporation as well as the psychological and physical health of the individual. The purpose of this course is to encourage future managers to evaluate the work environment and to enhance opportunities for diverse worker productivity, which should increase the corporation's competitive edge. The emerging fields of complementary and alternative medicines are explored as preventive and cost-effective methods of improving workers' health. Business models for encouraging workplace wellness, systems for implementation, reward, and accountability of managers and corporate officers will be introduced in this course. Only a few corporations overtly reward managers and corporate officers for the well-being and concomitant enhanced performance and productivity of their employees.

HADM 6631 Seminar in Multiunit-Restaurant Management

Spring, first seven weeks of semester. 2 credits. Elective. Deadline to drop is midpoint of course. Prerequisite: graduate standing; seniors only by permission of instructor. A. Susskind.

Through a series of directed readings, case studies, and roundtable discussions with industry leaders, this course focuses on strategic issues in the food and beverage

industry that affect the growth and development of multi-unit restaurant companies. In addition to the weekly scheduled seminar time, students are required to attend two receptions to honor the roundtable speakers. In class, students critically evaluate selected research papers related to multi-unit business management to serve as the basis for class discussion and the fostering of a broader understanding of leadership and growth strategies in the multi-unit restaurant business.

Operations**HADM 1101 Hotel Operations Management: Tactics for Profitability**

Summer. 3 credits. R. McCarthy and M. McCarthy.

In this Summer College program you will develop your business, management, and leadership skills while refining your computer, communication, and analytical skills. You will have the opportunity to explore the hospitality industry at the world-renowned School of Hotel Administration.

This course is designed to provide not only an elemental understanding of the hospitality industry but a realistic exposure to the work, decisions, and competitive forces that have an impact on all of those who take a professional stake, either directly in the industry or within one of its supporting industries. You will be responsible for coming up with a business plan and operating a 250-room simulated CHESSE Hotel. Through careful analysis of your hotel's financial information you will see the multiple impacts of the decisions you make and the issues that need to be taken into consideration and balanced in order to operate a profitable business. Your interpretation of your analysis will be presented in a concise, professional, and well-organized fashion in the form of a business report. You will learn how to use the Microsoft Office 2007 suite of products to support your analysis and to effectively communicate your findings. Your business report will serve as a cumulative demonstration of the knowledge that you have gained during the program.

HADM 1105 Introduction to Hotel Operations

Fall, spring, seven weeks. 2 credits. Required. Prerequisite: Hotel or ITD students. **Corequisite:** HADM 1106. Students enrolled in Lec 1 of HADM 1105 take Lec 2 of HADM 1106 in same semester, and vice versa. R. McCarthy.

This course is designed to introduce students to the scope of the hotel industry and the organizational structure and operational mechanics of how the departments within the rooms division of an individual hotel operate. Understanding the scope of the industry involves understanding who the major players are and what market segments their brands serve. Students gain an understanding of how work is performed and how activities are coordinated within the rooms division and among other hotel departments. Completion of a front desk and housekeeping practicum at the Statler Hotel is a required course activity.

HADM 1106 Introduction to Food Service Operations

Fall, spring, seven weeks. 2 credits.

Required. Prerequisite: Hotel or ITD students. Corequisite: HADM 1105. Students enrolled in Lec 1 of HADM 1106 take Lec 2 of HADM 1105 in same semester, and vice versa. S. Lipinski and R. Spies.

Students are introduced to the principles of foodservice operations, beginning with an overview of the foodservice industry at large. Attention is initially focused on major industry segments, business practices, and trends. Subsequently, detailed consideration is given to the components of the foodservice system: marketing, menu planning, production, service, controls, and quality assurance. Product and systems differentiation in various industry segments are emphasized throughout the course. Completion of a work experience in the Statler Hotel is a required course activity.

HADM 2201 Hospitality Quantitative Analysis

Fall, spring. 3 credits. Required. Prerequisite: Hotel or ITD students. R. Lloyd.

This introductory statistics course is taught from the perspective of solving problems and making decisions within the hospitality industry. Students learn introductory probability, as well as how to gather data; evaluate the quality of data; graphically represent data; and apply some fundamental statistical methodology. Statistical methods covered include estimation and hypothesis testing relating to one- and two-sample problems of means, simple linear regression, and multiple regression. Problems involving multiple means (one-way ANOVA) are covered as a special case of multiple regression, time allowing. Minitab is used as the statistical computing software.

HADM 3301 Service Operations Management

Fall, spring. 3 credits. Required. Limited to 70 Hotel students per lecture.

C. Anderson, G. Thompson, and R. Verma. Students are introduced to statistical and operations research methods that are appropriate for the hospitality industry. The goal of the course is to provide students with the skills and understanding necessary for making decisions using quantitative data. Students use computer spreadsheet software extensively. A key requirement of the course is an ability to communicate the results of analyses in a clear manner. Topics include probability; decision analysis; modeling; forecasting; quality management; process design; waiting lines; and project management.

HADM 3303 Club Management

Fall, second seven weeks; spring, first seven weeks. 2 credits. Elective. Deadline to drop course is midpoint of course.

Limited to 35 Hotel juniors and seniors only in fall, no freshmen; open to non-Hotel students only in spring; Hotel students by permission only. R. James. Students study private membership clubs and the leadership role in club administration. The application of current management principles in a not-for-profit environment is discussed, and club management is compared to other areas of the hospitality industry and other not-for-profit organizations. Topics

include tournament, facility, and recreation management; legal, financial, and legislative issues; human relations and human resource considerations; and marketing, pricing policies, and quality standards.

HADM 3305 Restaurant Management

Fall, spring. 4 credits. Required. Limited to 27 Hotel students per lab. Prerequisite: HADM 2236 and Bar Code and Serv-Safe certified. Cost of lab manual, certification for alcohol service, utensils for front- and back-of-house: approx. \$85. **Because of group work for this course, absolute deadline to drop course in fall is Sept. 4, 2009, and in spring is Feb. 5, 2010.** A. Susskind.

This course offers the opportunity to synthesize the skills, concepts, and theories students have learned in other classes and apply them practically in an actual restaurant setting. Lecture topics cover pertinent issues and principles relevant to the industry at large and then are incorporated as a class into actions that occur in the student-run operation.

HADM 4401 Restaurant Entrepreneurship

Fall, spring. 3 credits. Elective. Limited to 20 Hotel students. Prerequisite: written permission of instructor. Max. cost of five required field trips: \$350. G. Pezzotti.

This course is designed for students who have a strong interest in food and beverage operations and who may be considering a career as an entrepreneur. Under the supervision of the instructor and using student-developed case studies, students visit and analyze various independently owned and corporate restaurant operations. Analysis covers, but is not limited to the restaurant's concept (market), organization, ownership, management, physical structure, staff, front-of-the-house operations, back-of-the-house operations, and fiscal integrity. Readings about current topics in the restaurant industry are required. Classes alternate weekly between field trips (2:30 P.M. through dinner hour) and seminars/case presentations.

HADM 4402 Contract Foodservice Management

Spring. 3 credits. Elective. Prerequisites: HADM 1106 and HADM 2236. Faculty.

The course focuses on outsourcing foodservice operations management in venues such as business and industry, education, sports and entertainment, and lodging. It is particularly relevant since the service segment of business has been focusing on outsourcing all kinds of operational components. Students gain a broader perspective of hospitality foodservice operations rather than just restaurants and hotels. They also explore operational parameters appropriate for different types of foodservice venues, as well as evaluating RFPs and contracts.

HADM 4403 Specialty Food and Beverage Operations: Guest Chefs

Spring. 3 credits. Elective. Limited to 20 students. Prerequisite: Hotel juniors, seniors, and graduate students; HADM 3305; permission of instructor. G. Pezzotti.

This course is designed for students having a strong food and beverage orientation. Students considering a career in the hotel or restaurant food and beverage environment or those who anticipate interacting with present-day culinary trends find the course especially

beneficial. Over the course of the semester, the class, working in groups, will be responsible for the marketing, organization, planning, production, service, financial analysis, and accounting relative to three guest-chef specialty production nights. The chef will be asked to recommend the evening's menu reflecting his or her culinary background and work with the class in producing the meal for the Cornell community using the Hotel School's facilities. A required final project analyzes the relative degree of success experienced during each guest-chef event. The analysis considers consumer reactions as well as proper application of food and beverage management principles.

HADM 4404 Catering and Special Events Management

Fall. 3 credits. Elective. Limited to 30 students. Prerequisites: HADM 2236 or permission of instructor. Cost of required field trip to New York City: approx. \$250. R. Spies.

The catering and special events industries are among the fastest-growing segments within the hospitality industry. This course focuses on off-premise and on-premise catering for social and business functions and the management of large-scale independent events, such as sporting events, artistic performances, and product launches. Topics include organizational structure; legal aspects of catering and special events management; product and service development; marketing and sales; catered function and special event planning and execution; staff recruitment and training; post-event analysis; financial success of catering; and special events businesses.

HADM 4408 Introduction to Casino Operations

Fall. 2 credits. Elective. Limited to Hotel students, others by permission of instructor. Drop deadline for course is end of week three. Cost of required field trip to Atlantic City: approximately \$300. R. McCarthy.

A vital part of the hospitality industry, casino gaming is one of the most exciting and fastest-growing industries. This course focuses primarily on the operation and ownership of commercial casinos and the hotels attached to them. It is designed to introduce students to the internal and external casino environment. It looks at the historical development of gaming in America to understand how the industry has evolved to its present form. Students learn the organizational structure of a casino hotel, how it operates, and how it makes money. Students also gain an understanding of the different companies that own casino hotels and the current issues facing these companies. Topics include casino marketing strategies and player rating systems; the social and economic impact of gaming and the various regulatory environments within which casinos operate; and how common casino games are played and the mathematics of the various games. Students build on their food and beverage and hotel knowledge to better understand the specific challenges facing casino hotel operators.

HADM 5502 Advanced Hospitality Quantitative Analysis

Spring. 3 credits. Elective. Prerequisite: HADM 2201 or permission of instructor. R. Lloyd.

The course introduces students to topics in statistics that can be utilized by corporate or business leaders to aid in decision making. It builds upon the statistical knowledge gained from HADM 2201, including in-depth statistical techniques that may not be mainstream within the hospitality industry today, but which are growing in importance. Topics include more multiple regression; simple and multiple logistic regression; one- and two-factor ANOVA, with multiple comparison procedures; chi-squared tests of independence of categorical factors; tests of proportions; and predicting and forecasting with artificial neural networks. Computational programs include Minitab (used in HADM 2201) and Alyuda NeuroIntelligence.

HADM 6600 Advanced Revenue Management

Spring; second seven weeks. 2 credits. Elective. Hotel graduate students only, others by permission of instructor. This course is taught via video-conference with CNI-Singapore. S. Kimes.

In this course, students will work in virtual teams and learn how to apply revenue management solutions to nontraditional applications such as golf, spa, function space, and retail.

HADM 6602 Spa and Spa Hotel and Resort Development and Management

Fall, spring. 3 credits. Elective. Limited to 33 Hotel School seniors and graduate students; others may enroll, space permitting. Cost of two required field trips: approx. \$150. M. Tabacchi.

This course emphasizes the development, management, and marketing of free-standing spas, spas in hotels and resorts, and spa restaurants. Day spas, resort spas, and destination spas are studied in depth. The feasibility of success for new spas and the marketing research necessary to establish new spas are discussed. The design of menus, mental and physical fitness programs, stress management, spa medical treatments, complementary medical treatments, and other spa programs are all considered. Required personnel, safety, legal, and ethical issues regarding spas are an important part of the course. The integration of nutritious menu items into restaurant menus and their marketing and merchandising is studied. Guest speakers from spas are an integral part of the course.

[HADM 6603 Quality and Process Improvement

Spring. 3 credits. Elective. Prerequisite: graduate students only. Next offered 2010-2011. R. Verma.

The foundation of this course is on the emergence of quality management as a strategic focus in firms seeking excellence and a competitive edge. Topics include defining quality in service industries; techniques for designing high-quality services; process analysis; problem identification techniques; statistical process control techniques; process capability analysis; and robust design of service processes.]

HADM 6605 Yield Management

Fall, spring. 3 credits. Elective. Limited to 30 students. Prerequisite: senior or graduate standing; HADM 3301 or 7703 or equivalent. C. Anderson.

This course helps students learn how to apply the principles of yield management effectively. Focus is placed on the integration of yield management techniques with information technology, internal management issues, and external marketing concerns. Topics include yield management techniques, forecasting, overbooking, group decisions, and management and marketing issues.

HADM 6606 Restaurant Revenue Management

Fall. 3 credits. Elective. Limited to 40 students. Prerequisites: HADM 7703; graduate standing or permission of instructor. G. Thompson.

Revenue management is a method for managing capacity profitably. The objective of this course is to help students learn how to apply the principles of revenue management to maximize profitability in the restaurant industry. The course focuses on methods of managing duration and price with the intent of maximizing revenue per available seat-hour. Topics include forecasting, overbooking, reservations systems, information technology, process design, pricing, and management and marketing issues.

HADM 6609 Airline Service Management

Spring. 3 credits. Elective. Priority given to 30 seniors and graduate students; others may enroll, space permitting. Cost of field trip: approx. \$75. M. Tabacchi.

This course is a must for those interested in a career in the airlines industry. The impact of 9/11 upon the industry is investigated. Airline service and on-board services are used as competitive advantages by airline carriers. In fact, names such as Singapore Airlines and Virgin Atlantic have become synonymous with service excellence in the service economy. The strategies of developing competitive advantages and superior service in today's erratic economic climate are a major part of class discussion. Guest speakers from American Airlines, Singapore Airlines, US Airways, Delta, Continental Airlines, Virgin Atlantic, and SkyChefs are featured. In addition to service strategies both on the ground and in the air, students study the challenge of serving meals on international flights. Strategies, planning, and forecasting by these executives are examined. Case studies based on national and international airline business are an integral part of the course. A field trip to an airline's hub city enables students to observe first-hand the industry and its personnel in action.

HADM 7703 Operations Management

Summer. 3 credits. M.M.H. requirement. Prerequisite: M.M.H. students or permission of instructor. G. Thompson.

Based on principles of scientific management, the course gives students the skills and understanding necessary for decision-making using quantitative and qualitative data. Students use computer spreadsheet software extensively for "number-crunching" analyses and learn to communicate the results of their analyses in a clear manner. Students are provided with a "tool kit" of sophisticated Excel models for solving service-operations problems.

Facilities Management, Planning, and Design

HADM 2255 Hospitality Development and Planning

Fall, spring. 3 credits. Required. Not open to freshmen. S. Robson.

Students are introduced to the issues and opportunities inherent in the development and planning of hospitality facilities, specifically hotels and restaurants. Course components include the project development sequence; conceptual and space planning; architectural design criteria; construction management; and the interpretation of architectural design and consultant drawings. There is an emphasis on setting appropriate facilities requirements, understanding industry practice, and implementing properties decisions within a balanced design, operations, and financial framework.

HADM 3351 Hospitality Facilities Design

Fall. 4 credits. Elective. Limited to 36 students. Prerequisite: HADM 2255 or permission of instructor. R. Penner.

This intensive studio course provides the graphic skills important for design and experience in applying these skills in hospitality planning and design situations. Students prepare design projects using both hand drafting and computer-aided design (CAD) software. These assignments cover basic graphic skills and layouts for typical hotel spaces including guest room suite, lobby and lobby bar, and full-service restaurant or specialty coffee retail outlet.

HADM 3355 Hospitality Facilities Management

Fall, spring. 3 credits. Required. Prerequisite: HADM 2255. C. A. Fisher.

This course provides an overview of the operation of hospitality facilities, including operating costs for various types of facilities, types and characteristics of major building systems, and the responsibilities of the engineering maintenance department. The renovation needs of hospitality facilities are examined, and key managerial aspects of renovations are considered.

[HADM 4451 Restaurant Development

Fall. 3 credits. Prerequisites: Hotel seniors or graduate students; juniors by permission of instructor; for undergraduates: HADM 3305. Students who wish to develop design skills for restaurant concepts are encouraged to enroll in HADM 4453 in the following spring. Next offered 2010-2011. S. Robson.

Students are exposed to the process, challenges, and rewards of developing a restaurant concept from the idea to the construction of the first unit. The course includes readings, discussions with industry leaders, and cases and culminates with students formulating a detailed restaurant concept and development plan.]

HADM 4452 Sustainable Development and the Global Hospitality Industry

Fall. 3 credits. Elective. Prerequisite: junior, senior, or graduate standing. Cost of required overnight field trip: approx. \$150. Staff.

This multidimensional course introduces the global sustainability and environmental movements, their impact on the hospitality industry, and responses to and opportunities associated with sustainability. Readings will

be drawn from the environmental, sustainability, and hospitality literature. Students should be prepared to encounter conflicting views in the readings and in classroom discussions. The course attempts to portray a variety of viewpoints regarding issues of contemporary interest to society and the business community. Discussion of these issues is a key component of the course. An overnight field trip may be a required course activity.

[HADM 4453 Foodservice Facilities Design

Spring. 3 credits. Elective. Limited to 12 students per sec. Pre- or corequisites: HADM 3351, 3305, and 4451 or permission of instructor; Hotel seniors; juniors by permission of instructor. Grads should have commercial food production experience. Next offered 2010-2011. S. Robson.

This course provides an introduction to the basic concepts of foodservice facilities design and planning with an emphasis on restaurants. All documentation is produced on CAD, which is taught as part of the weekly studio. Students also use studio time for planning, designing, and writing specifications for a medium-size restaurant kitchen.]

HADM 4457 Hotel Development

Fall. 3 credits. Elective. Prerequisite: senior or graduate standing; juniors by permission of instructor. Cost of required overnight field trip: approx. \$150. Staff.

This multidimensional course introduces the global sustainability and environmental movements, their impact on the hospitality industry, and responses to and opportunities associated with sustainability. Readings will be drawn from the environmental, sustainability, and hospitality literature. Students should be prepared to encounter conflicting views in the readings and in classroom discussions. The course attempts to portray a variety of viewpoints regarding issues of contemporary interest to society and the business community. Discussion of these issues is a key component of the course. An overnight field trip may be a required course activity.

HADM 4459 International Hotel Development

Spring. 3 credits. Elective. Limited to juniors, seniors, and graduate students. Staff.

The seminar course includes discussion of corporate expansion strategies, the international development process, viewpoints of different stakeholders, and development challenges such as technology, infrastructure, environmental concerns, and public policy issues. Students research a variety of international destinations and the strategies of emerging management companies. Guest lecturers will present and discuss new projects in Europe, the Middle East, South America, and Asia, and contrast these opportunities to development in the United States.

HADM 7751 Properties Development and Planning

Fall. 3 credits. M.M.H. requirement. Prerequisite: M.M.H. students or permission of instructor. R. Penner.

This course serves as an overview of hospitality project development and planning from the perspective of an owner and

manager. Students learn about the role of the development team, feasibility studies, space programming, construction management, and functional and design criteria for hotels and restaurants. Teams prepare program documentation for a new hotel or restaurant or one undergoing major repositioning.

MARKETING, TOURISM, STRATEGY, AND INFORMATION SYSTEMS

Marketing, Tourism, and Strategy

HADM 1141 Micro-economics for the Service Industry

Fall, spring. 3 credits. Required. Limited to 70 Hotel students per lec. B. Carroll.

This course introduces students to microeconomic principles and theories in the context of applications and solutions associated with the service industry with a focus on hospitality and travel. Topics include principles of production, supply and demand, firm behavior, costs, pricing, and topics specifically associated with the travel and hospitality industry. Course work includes readings, lectures, discussions, problem sets, and guest speakers.

HADM 2241 Marketing Principles

Fall, spring. 3 credits. Elective.
Prerequisite: non-Hotel students. Not open to seniors or graduate students.
H. Chun and M. D. Giebelhausen.

This is a foundational marketing course that includes the study of concepts, activities, and decisions related to the exchange process, managing the marketing mix and development of marketing strategy in for-profit and not-for-profit organizations. In a nutshell, marketing is about customers and the development, distribution, and promotion of products. The grease that makes this process work is rooted in the concept of exchange. A priority is to understand how market decision-makers interact so as to create a mutually satisfactory exchange. Emphasis in this course will be placed upon a conceptual understanding of the concepts and ideas such that, as customers and service deliverers you might apply the ideas to your own lives.

HADM 2243 Marketing Management for Services

Fall, spring. 3 credits. Required. Limited to 70 Hotel students per lec; no freshmen.
H. Chun, C. Dev, M. D. Giebelhausen, and R. Kwortnik.

Students develop an understanding of marketing management: the process through which organizations analyze, plan, implement, and control programs to develop and maintain beneficial exchanges with target buyers. Students learn about marketing management through a mix of readings, lectures, class discussions, individual and group exercises, industry guest speakers, and exams. A key element of the course involves students working to create a marketing plan.

HADM 3340 Franchising in the Hospitality Industry

Spring, second seven weeks of semester. 2 credits. Elective. Not open to freshmen. Note: deadline to drop course is point of course. Grad students should enroll in HADM 6640. J. Lavin.

The course deals with relationships between the franchisor and the franchisee, advantages and disadvantages of franchising, structure of and services offered by franchisors. Case studies of leading lodging and restaurant companies currently offering franchises will be discussed. There also will be guest speakers from the franchising industry.

HADM 3343 Marketing Research for Decision Makers

Fall. 3 credits. Elective. Prerequisite: HADM 2243 and a statistics course.
M. D. Giebelhausen.

This course helps students become better consumers of marketing research. Topics include issues involved in designing, conducting, and interpreting focus groups, depth interviews, surveys, experiments, and choice models. Special emphasis is placed on what each method should and should not be used for and why.

HADM 3347 Consumer Behavior

Fall, spring. 3 credits. Elective. Limited to 200 students. Prerequisite: junior or senior standing; HADM 2243 or equivalent introductory marketing course. Grad students should enroll in HADM 6647. H. Chun and M. Lynn.

This course helps students become better at understanding, predicting, and influencing consumer behavior. Topics include motivation, perception, learning, decision making, attitudes, nonverbal communication, persuasion, compliance, geodemographics, and psychographics. The practical implications of psychological principles are emphasized. Specific applications involve such areas as guest frequency programs, menu design, promotional strategy, personal selling, sales and marketing planning, and marketing research. Class time is used for discussions and application exercises as well as for the presentation of relevant information.

HADM 4441 Strategic Management

Fall, spring. 3 credits. Required.
Prerequisites: senior standing; at least one course in accounting, finance, marketing, operations, economics, and information systems. Because students work in groups, absolute drop deadline is two weeks after first day of class. C. Enz, A. Kalnins, and R. Kosova.

Strategic management integrates all of your previous courses including marketing, finance, accounting, operations, etc., and introduces you to new strategic management concepts. The course examines the total enterprise, the industry, and the competitive environment in which it operates. Our goal is to develop a mastery of the analytical tools to perform analyses of the industry and competitors. We focus on how firms formulate, implement, and evaluate strategies. The emphasis of this course is on critical thinking and decision-making to maintain competitive advantage in a hypercompetitive and maturing industry using a case-based approach.

HADM 4443 Innovation and Dynamic Management (also AEM 3280)

Spring. 3 credits. Elective. Limited to 50 seniors and graduate students. C. Enz.

This is a university-wide course that investigates the innovation process, how firms develop innovations, and how to manage change. Innovation involves taking new knowledge and turning it into new products

or services. How successful an organization is in doing so depends on its ability to change and maintain simultaneously. Innovative firms are studied via case analyses. A project gives students hand-on exposure to innovation creation. Emphasis is placed on examining how businesses and managers can build profitable organizations through a process of creative rethinking, re-evaluating, and discarding existing practices. The class will operate as a seminar.

HADM 4444 Introductory Hospitality Entrepreneurship

Fall, spring, first seven weeks of semester. 3 credits. Elective. Prerequisite: HADM 2243 or equivalent. First preference to Hotel students, others by permission only. May not take HADM 4445 concurrently.
J. Quest.

An introductory course for the study of the discipline of entrepreneurship. Introduces students to the process of starting a business from the ground up and to the qualities that are associated with successful entrepreneurs. Students will learn to recognize a good/great business idea and how to evaluate it in terms of market opportunity; superiority of product or service; target audience; competitive landscape; and application of market research. This course will focus on: (a) identifying the business opportunity, (b) developing the concept, and (c) defining and constructing a business model. This course can be described as a business startup feasibility course that uses the construction of a business plan prototype as the format for the class learning experience. The subject matter will be energized with the natural enthusiasm that comes from the day-to-day experiences of starting your own business.

HADM 4445 Developing the Hospitality Entrepreneurship Business Plan

Fall, spring. 3 credits. Elective.
Prerequisite: HADM 2243 or equivalent. First preference to Hotel students, others by permission only. May not take HADM 4444 concurrently. J. Quest.

This is a course for students who wish to learn the disciplines involved in developing a business plan for a startup concept in the hospitality industry. The course will concentrate on the construction of business plans for new business concepts, focusing on all elements of the entrepreneurship discipline: identifying and validating a new business opportunity, and then organizing, constructing, and writing a sound, clear, concise business plan that will include the feasibility phases as well as determining the required resources, acquiring the necessary resources, structure for implementation and management, and strategy for harvesting the venture. Students will be introduced to actual business plans associated with successful capital raising, as well as a review of real-life examples of the process of raising money, furnished by the instructor and other sources. During the course, attention will be given to the disciplines of setting priorities; establishing operational budgets; and developing financial projections resulting from these budgets. This will include a projection for capital needed for startup. Upon completion of the construction of the business plans, the teams will present them to a panel of successful entrepreneurs and professional investors at the close of the course.

HADM 4446 Hospitality Pricing and Analysis

Spring, first seven weeks. 2 credits.
Prerequisite: HADM 1141 and HADM 2243, others by permission of instructor. W. Carroll.

The development and application of pricing strategies in the hospitality industry are presented. Marketing, economic, and financial-pricing principles are applied in the context of the hospitality industry. Students are exposed to both theory and the practical application of pricing tools and analytical processes. Major trends and issues in hospitality pricing are examined and discussed, including the emerging role of the channel management and dynamic travel packaging. Readings, lectures, discussions, cases, exercises, and presentations by industry experts are used to acquaint the student with the complexity and the methods of executing tactical and strategic hospitality pricing actions.

HADM 4447 Managing Hospitality Distribution Strategies

Fall, second seven weeks. 3 credits.
Elective. Prerequisites: HADM 1141 and 2243. B. Carroll.

This course provides a framework for managing marketing distribution strategies. Emphasis is placed on presenting and analyzing the structure and interrelationships among distribution channels within the travel and hospitality industry. Theories of marketing distribution management and analysis are evaluated and applied within the context of that system. Topics include dimensions of hospitality marketing distribution; economics of the major hospitality distribution segments; managing hospitality distribution strategies; and the role of convention and visitors bureaus, national tourist organizations, and associations in distribution management.

HADM 5540 Brand Management

Fall. 3 credits. Elective. C. Dev.
This course explores the impact of brands on consumer behavior, product management, and value creation. Through presentations, cases, exercises, and projects, we will examine the theories behind branding, the challenges of implementation, and current trends in branding. The traditional brand management system was created in the consumer packaged goods industry. In this course, we will evaluate its applicability to the service industry, in general, and the hospitality industry more specifically. We will discuss the evolving responsibilities of brand managers in these organizations—from brand introduction to brand extension to brand repositioning. Our ultimate goal is to for students to understand the opportunities and challenges faced by today's service organizations in creating, growing, managing, and evaluating brand equity.

HADM 5541 International Marketing

Spring. 3 credits. Elective. Prerequisite: core marketing class or permission of instructor. J. Katz.

The goal of this course is to teach students how to create an international expansion plan for products and services. The course progression follows the creation of such a plan; students submit four papers that reflect the components of this plan, and the final submission should look like a real international business plan. To that end, students learn how to identify internationally

transferable competitive advantages and define their product/service based on that; perform quantitative analyses of all potential markets; complete more detailed qualitative and quantitative analyses of two target markets (of their choice); and develop a marketing entry strategy.

HADM 6640 Franchising in the Hospitality Industry

Spring, second seven weeks of semester. 2 credits. Elective. Note: deadline to drop course is point of course. Undergrad students should enroll in HADM 3340. J. Lavin.

The course deals with relationships between the franchisor and the franchisee, advantages and disadvantages of franchising, structure of and services offered by franchisors. Case studies of leading lodging and restaurant companies currently offering franchises will be discussed. There also will be guest speakers from the franchising industry.

HADM 6641 International Business Strategy

Fall. Elective. 3 credits. Limited to advanced undergraduates and graduate students. R. Kosova.

This course will provide theoretical and analytical framework for understanding various aspects of international business environment and its implications for corporate-level strategy. It will also derive some implications for the global operations in the hospitality industry. After reviewing the basic concepts of international business strategy and current globalization trends, the course focuses on the detailed analysis of the global business environment, including: assessment of economic and political risks; impacts of cultural differences, international trade and commercial policy, exchange rates exposure, regional integration, role of global institutions as well as issues related to protection of property and intellectual property rights. Afterwards, the course analyzes how firms decide about market entry, pros and cons of various modes of entry including foreign direct investment (FDI) and debates political economy issues of FDI. At the end, the students have the opportunity to practice the learnt topics in the in-class game, which simulates the negotiations between multinationals, local companies, and governments during firm global expansion.

HADM 6645 Services Marketing and Customer Experience Management

Fall. 3 credits. Elective. Prerequisite: graduate standing; marketing course or permission of instructor. R. Kwornik.

Students will develop critical analytic skills and knowledge for implementing service strategies to create and manage the customer experience. Topics include services consumer behavior and decision processes; services research methods; service quality analysis; customer-relationship management and service recovery; service experience design (analysis of "service as theater," service "blueprinting," and the "servicescape"); and integrated marketing communication strategies for services. Students learn through discussion of current services theories and research, experiential exercises, case analyses, and industry guest speakers. A main focus of the course is a team consulting project involving a services-marketing audit of a "live" organization.

HADM 6647 Consumer Behavior (also NBA 6260)

Fall. 3 credits. Elective. Limited to 25 graduate students. M. Lynn.

This course helps students become better at understanding, predicting, and influencing consumer behavior. Topics include motivation, perception, learning, decision-making, attitudes, nonverbal communication, persuasion, compliance, geodemographics, and psychographics. The practical implications of psychological principles will be emphasized. Specific applications will involve such areas as guest frequency programs, menu design, promotional strategy, personal selling, sales and marketing planning, and marketing research. Class time is used for discussions and application exercises as well as for the presentation of relevant information.

HADM 6649 Integrated Marketing Communications (also NBA 6210)

Fall. 3 credits. Prerequisite: for non-Hotel students permission of instructor.

This course is designed to provide students with the framework and skills required to design, manage, and evaluate integrated marketing communication programs. The course will focus on exploring these tools within the hospitality industry, but the lessons learned can be applied broadly to any service or service-oriented industry. Over the past decade, the number of communication options available to consumers, and hence to organizations, has grown exponentially. With so many different avenues for communication to, from, and among consumers, organizations must approach the communication task with the objective of creating a unified message that is consistent, coherent, and effective across all media—an integrated marketing communications program. Through class exercises, case studies, advertising critiques, online observation and participation, and teamwork on a simulated campaign, students will master the skills necessary for marketing campaign management.

HADM 7743 Marketing Management for Services

Summer. 3 credits. M.M.H. requirement. Prerequisite: M.M.H. students or permission of instructor. M. Lynn.

This course covers the fundamental concepts of marketing management and the techniques, analyses, and frameworks for solving marketing-management problems. Students explore theories and conceptual frameworks that draw on customer, competitor, and core-capability analyses in marketing planning and implementation. Students develop decision-making capabilities in product/service development, pricing, advertising and promotions, and distribution policies. The capstone of the course is team development of a marketing plan for a new hospitality business.

HADM 7444 Competitive Strategies for the Hospitality Industry

Spring. 3 credits. M.M.H. requirement. Prerequisite: M.M.H. students or permission of instructor. A. Kalnins.

The course examines competitive strategies, cooperative strategies, and growth strategies within the hospitality industries and beyond. Our goal is to develop a mastery of the strategic issues facing hospitality as well as important new qualitative tools to perform analyses. We use a case-based approach that

focuses not only on hospitality but other industries as well, allowing thinking “outside the box” and developing novel solutions not possible but studying only hospitality. The course integrates knowledge from all of previous M.M.H. courses including marketing, finance, organizational behavior, and human resources.

Information Systems

HADM 1174 Business Computing

Fall, spring. 3 credits. Required. Limited to 40 students per sec: fall, Hotel freshmen and transfer students; spring, open enrollment. M. Talbert.

This course provides a foundation in information technology (IT) and how it relates to everyday business computing. Students learn IT concepts during lectures, and these concepts are reinforced in practical lab sessions using current standards of business computing. Topics include fundamental IT concepts; proficiency in Microsoft Office; understanding the issues of tool selection, standardization, and efficiency; integration of applications; and recognizing the importance of good computer management.

HADM 2274 Business Computing

Spring. 3 credits. Elective. Limited to 30 non-Hotel students per lec. Co-meets with HADM 1174. M. Talbert.

This course provides a foundation in information technology (IT) and how it relates to everyday business computing. Students learn IT concepts during lectures, and these concepts are reinforced in practical lab sessions using current standards of business computing. Topics include fundamental IT concepts; proficiency in Microsoft Office; understanding the issues of tool selection, standardization, and efficiency; integration of applications; and recognizing the importance of good computer management.

HADM 2275 Introduction to Information Systems Management

Fall, spring. 3 credits. Required. Prerequisite: Hotel students; HADM 1174. P. Clark.

Goals for the course are to learn about information systems; understand and be able to clearly articulate the difference between information technology and information systems; link concepts and technical jargon to the real-world uses of information systems; and learn the information-systems fundamentals needed throughout hospitality careers. The course is designed for students who will work within hospitality organizations as end users, user-managers, leaders, and information-systems professionals. This is not a course for technologists but rather for the general-management student. Students are provided with the essential information that all hospitality management professionals should know about information systems.

HADM 4476 Visual Basic for Applications: End-user Programming

Fall, spring 3 credits. Elective. Limited to 30 students per lec. Due to capacity restraints in Binenkorb lab, attendance at first class is mandatory; no-show students are dropped to make room for stand-by students; students may not drop course after second week of class. M. Talbert.

This is an introductory programming course for end-users (e.g., business managers and consultants). Students develop fluency in the popular Visual Basic for Applications (VBA) language. Using VBA, students learn how to customize and extend the Microsoft Office Suite, with an emphasis on Excel. They also develop custom information systems using Microsoft Office applications as programmable building blocks. Secondary objectives of the course are to cover fundamental design and programming principles. The course is entirely lab-based.

HADM 4477 Advanced Business Modeling

Fall, spring. Lec 1 is first seven weeks of semester, Lec 2 is second seven weeks. 2 credits. Limited to 21 seniors and graduate students; priority given to M.M.H. students. Prerequisite: HADM 1174. Note: Deadline to drop course is midpoint of course. M. Talbert, M. McCarthy.

This course focuses on organizational systems, planning, and decision process and how information is used for decision support in organizations. Students are provided with practical skills in developing spreadsheet computer models using Microsoft Excel. Topics include business planning and forecasting, numerical methods, advanced formulas and functions, user-interface design, data protection and validation, importing external data, and output presentation.

HADM 7772 Information Systems Management

Spring. 3 credits. M.M.H. requirement. Prerequisite: M.M.H. students or written permission of instructor. Faculty.

Information technologies (IT)-based information systems are important to almost all organizations. They are a primary means for ensuring efficient operations and effective decision-making, and they offer the potential to increase a firm's competitiveness when appropriately planned and used. Students become comfortable with all aspects of information systems decision-making, including systems analysis and design, systems selection and purchasing, and the risks of IT investments. They become familiar with the systems found in hospitality operations. The course is not overly technical, but students are expected to be comfortable researching and discussing information technologies.

FINANCE, ACCOUNTING, AND REAL ESTATE

Finance/Accounting

HADM 1120 Personal Financial Management

Fall, spring. 2 credits. Elective. Limited to 120 non-Hotel students. L. Hensley and E. Cornell.

Students are provided with an overview of personal financial planning including money management, tax planning, use of credit, insurance, investing, retirement planning, and estate planning.

HADM 1121 Financial Accounting

Fall, spring. 3 credits. Required. Prerequisite: Hotel undergraduates. D. Dittman.

This course is an introduction to financial accounting that studies transaction analysis, the balance sheet, income statement, statement of cash flows, and the statement of stockholder's equity. Accounting for investments, bonds, receivables, inventories, tangible and intangible assets, capital stock transactions, as well as the direct and indirect methods for cash flow are analyzed. Basic financial ratios are introduced and interpreted.

HADM 2221 Managerial Accounting

Fall, spring. 3 credits. Required. Prerequisites: Hotel undergraduates; HADM 1121 or equivalent. G. Potter and J. Hesford.

This course focuses on the use of accounting information for management decision making and control. Topics include product costing, budgeting, management decision making, and control systems. There will be one common final exam at the end of the semester.

HADM 2222 Finance

Fall and spring. 3 credits. Required. Prerequisite: Hotel students or permission of instructors. C. Chang and Q. Ma.

The course will provide students with a broad understanding of managerial finance. The overall objective is to develop skills in using accounting and cash flow information for financial planning, capital structure decisions, capital budgeting evaluation, and long-term financial decision-making. Topics will include valuation of investments, capital budgeting decisions, risk analysis for capital budgeting, capital structure, long-term financing, cost of capital, debt capacity, and raising capital in the public markets. When appropriate, specific examples relating to important issues in the hospitality industry will be discussed.

HADM 2223 Financial Accounting Principles

Fall, spring. 3 credits. Elective. Prerequisite: non-Hotel undergraduates. N. Geller and P. Strebel.

This course serves as an in-depth introduction to the principles of financial accounting, involving transaction analysis, flow of accounting data to the financial statements, and careful consideration of accounting for revenues, expenses, assets, liabilities, and owner's equity.

HADM 2225 Finance

Fall, spring. 3 credits. Elective. Limited to non-Hotel undergraduates. J. Wellman. Students are exposed to a wide variety of corporate finance topics, including time value of money, risk and return, valuation models, cost of capital, capital budgeting, capital structure, and dividend policy.

HADM 3321 Hospitality Financial Management

Fall, spring. 3 credits. Required. Prerequisites: HADM 1121, 2221, and 2222, or permission of instructor. J. deRoos.

This course focuses on owners of hospitality assets and on equity investors in these assets. The course develops an appreciation of the strategic role of real estate in the hotel and restaurant industries and the role of unit-level financial analysis in making investment decisions. That appreciation forms the essence of financial management in hospitality real estate. The course builds competence in using the quantitative tools of financial economics. Topics include property rights, hotel and restaurant investment analysis, valuation of the

assets and the owner's equity, the drives of unit level revenues and value, an introduction to the fundamentals of hotel and restaurant financing, and an overview of the management contracts and franchise agreements used in hotels and restaurants.

HADM 3325 Financial Planning and Wealth Management

Fall, spring. 3 credits. Elective.

Prerequisite: junior or senior standing. P. Strelbel.

Students are exposed to the many facets of wealth management: creating a coordinated financial plan, the dynamics of working with clients, the challenges of running a financial planning practice, and the attributes and skills required to be a successful financial advisor. This course is geared toward students interested in working in an advisory capacity with clients in fields such as investment banking, brokerage, insurance industry, accounting and tax, consulting, law, social work, banking, credit unions, lending institutions, securities, and investments.

HADM 4422 Taxation and Management Decisions

Fall. 3 credits. Elective. Limited to 75 students. Prerequisite: junior, senior, or graduate standing. L. Hensley.

This course introduces students to the tax advantages and disadvantages of the various organizational structures, including corporations, partnerships, and subchapter "S" corporations. Other topics include financial information reporting to tax authorities and to shareholders and how these reports differ; the use of depreciation methods to achieve tax reductions; and syndication techniques and the role tax laws play in promoting private investments and development.

HADM 4425 Securitization and Structured Financial Products

Fall. 3 credits. Elective. Limited to 30 students. Prerequisite: HADM 2222 or equivalent. P. Liu and D. Lebret.

This course deals with the structure and analysis of securitized financial products with an emphasis on residential and commercial mortgage-backed securities (MBS). The course is intended for those who wish to acquire a working knowledge of the analysis of such securities (e.g., collateralized mortgage obligations, commercial MBS, auto loans, and credit card-backed securities) and an understanding of the securitization process. The course's subject matter necessitates a highly analytic and quantitative approach, and students are required to have a strong background in finance and economics. Students who have questions about preparation or background should see the instructor.

HADM 4426 Advanced Corporate Finance

Spring. 3 credits. Elective. Prerequisite: junior or senior standing; HADM 3321.

Graduate students should enroll in HADM 6626. Q. Ma.

Building on the finance class sequence (HADM 2222 Finance and HADM 3321 Hospitality Finance Management), this course helps students develop a framework that is useful for understanding a broad range of major corporate financial policies. While the course materials are relevant to businesses in general, special emphasis will be placed on

applying the framework in the hospitality industries. The framework and applications will be useful to those who will work for corporations, those who will serve as outside consultants to corporations on appropriate financial policies, and those who will work as external financial analysts, whose primary focus is on understanding and evaluating the financial decisions made by corporate management.

HADM 4429 Investment Analysis and Portfolio Management

Fall. 3 credits. Elective. Prerequisites: introduction to corporate finance, financial accounting, introduction to statistics, and beginner knowledge of Excel or permission of instructor. Graduate students should enroll in HADM 6629. C. Chang.

The course is an exploration of the three major investment vehicles: bonds, equity, and derivatives. In each case, students discuss what they are, how they are valued, and what risks they entail. The intimate relationship between return/value and risk is explored. At the focus of these discussions lies the idea that optimal investing is chiefly about balancing risk with returns; extracting maximum gains with minimum exposure; and creating portfolios with "good trade-offs." A study of theories develops a toolkit of skills, and a detailed look at practical application, including pricing anomalies, trading "programs," and a hands-on portfolio simulation, hopes to illuminate this investigation.

HADM 6624 Reporting and Analysis of Financial Statements

Fall. 3 credits. Elective. Limited to 40 students. Prerequisite: junior, senior, or graduate standing. G. Potter.

This course is designed to provide an understanding of the basic accounting model and the accounting rules for the measurement of assets, liabilities, and owners' equity. Emphasis is placed on understanding the economic substance of the transactions and the implications of using alternate accounting rules on the resulting numbers, especially in assessing the "earnings quality" of hospitality firms. Focus is from an outsider's view of the company, and students should be able to evaluate and interpret published financial information, specifically in the context of valuation, debt and compensation contracts, and credit assessment.

HADM 6625 Securitization and Structured Financial Products

Fall, spring. 3 credits. Elective. Limited to 40 seniors or graduate students; others by permission of instructor. Prerequisite: HADM 2222 or 7723. D. Quan and D. Lebret.

This course deals with the structure and analysis of securitized financial products with an emphasis on residential and commercial mortgage-backed securities (MBS). The course is intended for those who wish to acquire a working knowledge of the analysis of such securities (e.g., collateralized mortgage obligations, commercial MBS, auto loans, and credit card-backed securities) and an understanding of the securitization process. The course's subject matter necessitates a highly analytic and quantitative approach, and students are required to have a strong background in finance and economics. Students who have questions about

preparation or background should see the instructor.

HADM 6626 Advanced Corporate Finance

Spring. 3 credits. Elective. Prerequisite: HADM 3321; graduate standing.

Undergraduates should enroll in HADM 4426. Q. Ma.

For description, see HADM 4426.

HADM 6629 Investment Analysis and Portfolio Management

Fall. 3 credits. Elective. Prerequisites: introduction to corporate finance, financial accounting, introduction to statistics, and beginner knowledge of Excel or permission of instructor.

Undergraduates should enroll in HADM 4429. C. Chang.

For description, see HADM 4429.

HADM 7723 Corporate Finance

Summer. 3 credits. M.M.H. requirement.

Prerequisite: M.M.H. students or permission of instructor. L. Canina.

This course builds on the prerequisite courses of financial accounting and financial reporting. Topics include applications of discounting techniques; evaluation of capital expenditures; estimation of cost of capital; bond and stock valuation; portfolio theory; asset-pricing models; and capital-structure decisions. The course emphasizes valuation skills as a means to bring together the cost of capital, financing, and operating issues faced by a firm. Students come to understand the financial impact of managerial decisions; know how to differentiate decisions that increase the value of a firm; and know how to properly evaluate investment, financing, and payout decisions. They also learn standard techniques of financial analysis, such as discounted cash-flow valuation, capital budgeting, risk analysis, and estimation of the cost of debt and equity.

HADM 7724 Managerial Accounting

Summer. 3 credits. M.M.H. requirement.

Prerequisite: M.M.H. students or permission of instructor. J. Hesford.

This introduction to managerial accounting, which is the use of accounting information for decision-making and control, covers: cost behavior, cost classification, cost-volume-profit analysis, product costing, budgeting, variance analysis, cost estimation, cost allocations, customer-profitability analysis, managerial control systems, and performance measurement.

Real Estate Development

HADM 4420 Principles of Real Estate

Fall, spring; 3 credits. Elective. Limited to 50 students. Prerequisites: HADM 2222 or equivalent; junior or senior standing. P. Liu.

This course serves as an introduction to real estate finance and investment. The emphasis of Real Estate Principles is on developing valuation and decision-making skills. It introduces students to the business of real estate, both residential and commercial real estate, including roles, activities and players, terminology, and how the tools, concepts, and models in real estate are used in decision-making. The objectives of this course are twofold: (1) to help students develop an understanding of real estate fundamentals; and (2) to introduce students to the quantitative aspects of real estate—

investment decision-making, valuation under uncertainty, and debt financing.

HADM 4423 Hospitality Real Estate Finance

Fall. 3 credits. Elective. Prerequisite: HADM 3321 or equivalent; junior or senior standing. Graduate students must enroll in HADM 6621. D. Quan.

This course focuses on real estate financing for hospitality-oriented projects. Lectures address the following topics: methods of measuring rates of return; feasibility and appraisal processes; equity and debt financing vehicles to include joint ventures, limited partnerships, construction mortgages, and participating, convertible, and seller-financed mortgages; forms of operating agreements to include management contracts, leases, and franchises; and trends in international hotel franchising. Presentations by hospitality industry real estate practitioners tie course material to current industry practices.

HADM 4428 Real Estate Finance and Investments

Fall, spring. 3 credits. Elective. Limited to Program in Real Estate and Hotel undergrad students; others by permission of instructor. Prerequisites: HADM 3323 or 6621, HADM 4420 or 6620. D. Lebrét.

This course promotes sound real estate investment and finance decision-making, the use of advanced theory, and techniques in financial economics. Real estate investment decisions are made through applications of an extended version of the after-tax discounted cash flow model and other valuation models, including option pricing and regression models. Financing decisions are made using the techniques of modern financial analysis. A wide array of financing options are considered including participating and accrual mortgages. Securitization of equity and debt claims to real estate also are covered extensively. All types of residential and nonresidential real estate are analyzed, including hospitality properties.

HADM 6620 Principles of Real Estate

Fall, spring. 3 credits. Elective. Prerequisite: Hotel M.M.H. and Program in Real Estate students or permission of instructor. P. Liu.

The course is designed to facilitate student learning of real estate fundamentals. This will include both residential and commercial real estate, and develop a thorough understanding of residential mortgage finance and commercial real estate investments. The major objectives of this course are twofold: (1) to help you to develop an understanding of real estate; its practice, its institutions, and its players; and (2) to introduce you to the quantitative aspects of real estate; investment decision making, valuation, and debt financing.

HADM 6621 Hospitality Real Estate Finance

Fall. 3 credits. Elective. Prerequisite: graduate standing. D. Quan.

This course focuses on real estate financing for hospitality-oriented projects. The following topics are addressed: methods of measuring rates of return; feasibility and appraisal processes; equity and debt financing vehicles to include joint ventures, limited partnerships, construction mortgages, participating, convertible and seller-financed mortgages; forms of operating agreements to include management contracts, leases, and

franchises; and trends in international hotel franchising. Presentation of hospitality industry real estate practitioners will tie course material to current industry practices.

HADM 6622 Hospitality Asset Management

Spring, second seven weeks. 2 credits. Elective. Prerequisite: for undergraduates, HADM 3321 and completion of HADM 4420 highly recommended; for graduate students, HADM 7723 and completion of HADM 6620 highly recommended. J. deRoos.

Hotel asset management is the fiduciary responsibility of managing the hospitality investment to meet the specific objectives of ownership. The asset manager's role in building value is analyzed at both the portfolio and property levels. Lectures, assignments, cases, and guest speakers introduce the latest techniques in asset management and provide insights into the current lodging-market and operational challenges. Topics include management contracts; managing the manager; benchmarking property performance; and the capital improvements decision.

HADM 6628 Real Estate Finance and Investments

Spring. 3 credits. Elective. Limited to Program in Real Estate and Hotel grad students; others by permission of instructor. Prerequisites: HADM 3323 or 6621, HADM 4420 or 6620. Software fee: approx. \$50. J. Corgel.

This course promotes sound real estate investment and finance decision-making, the use of advanced theory, and techniques in financial economics. Real estate investment decisions are made through applications of an extended version of the after-tax discounted cash flow model and other valuation models, including option pricing and regression models. Financing decisions are made using the techniques of modern financial analysis. A wide array of financing options are considered including participating and accrual mortgages. Securitization of equity and debt claims to real estate also are covered extensively. All types of residential and nonresidential real estate are analyzed, including hospitality properties.

HADM 6667 Advanced Revenue Management

Fall, spring. 3 credits. Elective. By application only. Application closing dates are well in advance of registration. Prerequisites include HADM 4428 or HADM 6628 or equivalent course work and securities investment experience.

Students manage a real-world portfolio of publicly traded real estate securities and unlisted real estate fund unit interests. Investment management of the portfolio involves fundamental research in property and securities markets, making initial investments in real estate companies and funds, executing trades in positions held in the portfolio, developing/testing trading strategies, and managing risk. The objective of the course is to promote sound real estate investment decision-making. Students will be exposed to a broad literature on real estate securities, fund investing, trading strategies, and hedging. They will be provided opportunities to practice advanced methods of investment management and securities trading with special applications to real

estate, such as taking simultaneous long/short positions to hedge systematic risk, using newly created derivative real estate securities to directly hedge long positions, and running portfolio optimizers to manage unsystematic risk. All types of residential and commercial real estate securities are analyzed, including those of hospitality firms.

OTHER

HADM 4491 Hotel Ezra Cornell (H.E.C.)

Fall and spring. Variable credit: 2–3 in fall and 3–4 in spring. Elective. Prerequisite: Hotel juniors, seniors, and second-year M.M.H. students; others by permission of instructor. Cost of required field trip to November hotel show in NYC: approx. \$200. R. McCarthy.

The HEC Board of Directors are responsible for planning, organizing, staffing, directing, and controlling the weekend-long HEC conference to be held April 8–11, 2010. HEC's mission is to "Showcase Hospitality Education Through Student Leadership." For 80-plus years, HEC has been an essential part of the Cornell Hotel School, allowing students the opportunity to put theory into practice while taking on the leadership responsibility for this student-run hospitality showcase. Board members receive credit for their participation in HEC: 3 Hotel Elective credits in the fall and 3 Free Elective credits in the spring.

Students who are interested in running for board positions in the spring must be in good academic standing with a minimum GPA of 2.5. Eligibility requirements for specific board positions can be obtained from the HEC Office (G72 Statler Hall) and will be distributed to the student body. If you are interested in a board position you are encouraged to discuss your intention with the HEC course instructor.

HADM 4493 Management Intern Program I—Operations

Fall, spring. 6 credits. Elective. Prerequisites: Hotel freshman and sophomore core courses. Highly recommended: HADM 3321, 3305, 3355, and 3365. Additional course work may be required for applicants considering specialized internships. Students must submit detailed plan for completion of all remaining academic requirements before acceptance into course. Faculty.

Limited to juniors and seniors in the Hotel School with approval of the Management Intern Program (MIP) faculty committee. The application process begins the semester before the planned internship. An MIP information meeting is held at the beginning of each semester. Students accepted to MIP enroll in both HADM 4493 and 4494. Students enrolled in HADM 4493 receive academic credit in free electives as well as practical experience in the hospitality field. Six performance evaluations are used to determine this grade. Students must be in good academic standing and have a GPA of at least 2.5 in the preceding semester. Further information is available in the Office of Student Services, 180 Statler Hall.

HADM 4494 Management Intern Program II—Academic

Fall, spring. 6 credits. Elective.

Prerequisite: junior or senior standing in Hotel School; permission of Management Intern Program (MIP) faculty committee. Faculty.

The application process begins the semester before the planned internship. An MIP information meeting is held at the beginning of each semester. Students accepted into MIP enroll in both HADM 4493 and 4494. Students enrolled in HADM 4494 receive academic credit in free electives for submission of a goals and objectives statement, four management reports, six journal entries that focus on insights gained through analysis of events occurring in the workplace, and four Hospitality Management Checklist summaries. Upon return to campus, each intern completes a debriefing and an oral presentation to fulfill the academic requirements. Students must be in good academic standing and have a GPA of at least 2.5 in the preceding semester. Further information is available in the Office of Student Services, 180 Statler Hall.

HADM 4497 Undergraduate Research

Fall, spring. Variable credit. Elective.

Limited to juniors and seniors with a cumulative GPA of at least 3.3. Faculty.

Outstanding students may conduct independent research under faculty supervision. Each student is expected to review pertinent literature, prepare a project outline, conduct the research, and prepare a report. Students make two presentations coordinated by the Center for Hospitality Research (CHR): one at a preliminary stage and one at project completion. Students submit the completed report to the CHR, which will be available online through the CHR web site.

HADM 4498 Undergraduate Independent Study

Fall, spring. Variable credit. Elective. Faculty.

This course can be taken only by students conducting two independent studies in one semester. For more details, see HADM 4499.

HADM 4499 Undergraduate Independent Study

Fall, spring. Variable credit. Elective. Faculty.

Students have the option of conducting an independent study project in any academic area. The number of credits for which students may register are arranged on an individual basis. Note: Students commit themselves to a certain number of credits of independent academic work per week per credit hour if they choose to do an independent study project, and the work must be performed in the semester for which the student is enrolled in the independent study. The usual add/drop policy applies, and retroactive credit for work commenced after an academic semester has ended is not allowed. Projects are conducted under the direction of a faculty member, and regular, frequent consultations are mandatory. Also, a written report must be produced and made available to all faculty members and students of the school after its submission to the supervising faculty member. Credit for independent study projects may not count toward the hotel school elective requirement, but, rather, toward free electives. Students

cannot earn academic credit for independent study when the equivalent material is offered in a regular course, and credit is not earned for teaching a course. Students should consider all aspects of their situation before committing themselves to an independent study project. Enrollment forms are available in the Office of Student Services, 180 Statler Hall.

HADM 5590 Derrida and the Philosophy of Hospitality (also GOVT 4646/6675, FREN 4646/6690)

Fall. 4 credits. D. Rubenstein and L. Shaffer.

Beginning with an examination of hospitality in Plato, Xenophon, Kant, Levinas, and the Bible, we focus on the writings of Jacques Derrida on hospitality from the 1990s until his death. We also consider contemporary readers of hospitality and cosmopolitanism such as Tracy McNulty, Pierre Bourdieu, Seyla Benhabib, Bonnie Honig, James Davidson, Andrew Sandoval-Strausz, and Wayne Koestenbaum. These theoretical texts would be put in tension with practitioners such as Danny Meyers, E. M. Statler, films (Frears, Loach), novels (Kirin Desai), and labor manifestos (Ehrenreich, Levinson.)

HADM 6698 Graduate Independent Research

Fall, spring. Elective. Staff.

Each student must have in mind a project and obtain agreement from an individual faculty member to oversee and direct the study. Written permission is required before course enrollment. Permission forms are available in the Office of Student Services, 180 Statler Hall.

HADM 6699 Graduate Independent Research

Spring. 2 credits. Elective. Staff.

Each student must have in mind a project and obtain agreement from an individual faculty member to oversee and direct the study. Written permission is required before course enrollment. Permission forms are available in the Office of Student Services, 180 Statler Hall.

HADM 7795 Master of Management in Hospitality Master Class

Spring, three-day immersion seminar taught by industry leaders at their establishment during Jan. winter break.

1 credit. Elective. Prerequisite: M.M.H. students or permission of instructor. Faculty.

Students solve problems based on real-life scenarios and present their solutions to industry leaders and the Hotel School faculty members who accompany them. A final paper is due in the spring semester immediately following the seminar.

HADM 7796 M.M.H. Charette

Fall. 1 credit. Required. Prerequisite: M.M.H. students. Staff.

Held during fall break. The M.M.H. Charette is one of several professional and leadership development elements in the required M.M.H. program curriculum. The M.M.H. Charette provides students with a group dynamics laboratory, giving an opportunity to practice group problem solving, prepare a group presentation, and receive group feedback. The Charette is conducted over an intensive weekend working with faculty and a firm in the hospitality industry. Students, working in groups on a problem defined by the firm,

present the results of their work to a panel of faculty and firm representatives 48 hours after receiving instructions.

HADM 7797 Hospitality Industry Leadership Development Program

Summer. 1 credit. M.M.H. requirement.

Prerequisite: M.M.H. students or permission of instructor. Faculty.

A dozen or more senior executives from the hospitality industry visit the campus to evaluate students as individuals and as part of a team. They assess how well the students are able to lead, take direction, work with others, present ideas, and listen to other ideas. At the end of the class, one or more of the industry "coaches" meet with students individually, and in teams, to evaluate performance. This centerpiece of the orientation process is designed to outline some of the personal and career goals students will want to work toward in the coming year.

HADM 8890 M.S. Thesis Research

Fall, spring. Required. Faculty.

HADM 9990 Ph.D. Thesis Research

Fall, spring. Required.

FACULTY ROSTER

- Anderson, Chris, Ph.D., U. of Western Ontario. Asst. Prof.
 Brownell, Judith, Ph.D., Syracuse U. Prof., Dean of Students
 Canina, Linda, Ph.D., New York U. Assoc. Prof., Editor, *Cornell Quarterly*
 Carroll, William, Ph.D., Penn. State U. Sr. Lec.
 Carvell, Steven A., Ph.D., SUNY Binghamton. Assoc. Prof., Assoc. Dean of Academic Affairs
 Chang, Charles S., Ph.D., U. of California, Berkeley. Asst. Prof.
 Chun, Hae-Eun (Helen), Ph.D., U. of Southern California. Asst. Prof.
 Clark, Preston, M.S., Syracuse U. Lec.
 Corgel, John, Ph.D., U. of Georgia. Robert C. Baker Professor of Real Estate
 deRoos, Jan A., Ph.D., Cornell U. Hospitality Valuation Services Professor of Hotel Finance and Real Estate
 Dev, Chekitan S., Ph.D., Virginia Polytechnic Inst. and State U. Assoc. Prof.
 Dittman, David A., Ph.D., Ohio State U.
 Herbert E. Westfall Professor of Accounting
 Enz, Cathy A., Ph.D., Ohio State U. Prof. and Lewis G. Schaeneman, Jr. Professor of Innovation and Dynamic Management
 Giebelhausen, Michael D., Ph.D., Florida State U. Asst. Prof.
 Hesford, James, Ph.D., U. of Southern California. Asst. Prof.
 Hinkin, Timothy, Ph.D., U. of Florida. Prof., Richard J. and Monene P. Bradley Director of Graduate Studies
 Jameson, Daphne A., Ph.D., U. of Illinois. Assoc. Prof.
 Johnson, Michael D., Ph.D., U. of Chicago. Dean and E. M. Statler Professor
 Kalnins, Arturs, Ph.D., U. of Michigan. Assoc. Prof.
 Katz, Jan H., Ph.D., Massachusetts Inst. of Technology, Senior Lecturer
 Kimes, Sheryl E., Ph.D., U. of Texas. Singapore Tourism Board Distinguished Professor in Asian Hospitality Management
 Kosova, Renata, Ph.D., U. of Michigan. Asst. Prof.

Kwortnik, Robert, Ph.D., Temple U. Asst. Prof.
Lennox, David, Ph.D., U. of Washington. Lec.
Liu, Peng, Ph.D., U. of California, Berkeley.
Asst. Prof.
Lloyd, Russell, Ph.D., Cornell U. Sr. Lec.
Lynn, Wm. Michael, Ph.D., Ohio State U. Prof.
Ma, Qingzhong, Ph.D., U. of Southern
California. Asst. Prof.
McCarthy, Reneta, M.P.S., Cornell U. Lec.
Mutkoski, Stephen A., Ph.D., Cornell U. Banfi
Vintners Professor of Wine Education and
Management
Newman, Amy, M.S., New York U. Lec.
Norkus, Greg, M.S., Cornell U., Sr. Lec.
Penner, Richard H., M.S., Cornell U. Prof.
Pezzotti, Giuseppe G. B., M.P.S., Cornell U. Sr.
Lec.
Potter, Gordon S., Ph.D., U. of Wisconsin,
Madison. Assoc. Prof.
Quan, Daniel W. C., Ph.D., U. of California,
Berkeley. Prof.
Robson, Stephani, M.S., Cornell U. Sr. Lec.
Sherwyn, David, J.D., Cornell U. Assoc. Prof.
Siguaw, Judy, D.B.A., Louisiana Technical U.
Prof.
Simons, Tony L., Ph.D., Northwestern U.
Assoc. Prof.
Snow, Craig, Ph.D., Purdue U. Sr. Lec.
Spies, Rupert, Studienassessor. Zweites
Staatsexamen. Sr. Lec.
Sturman, Michael, Ph.D., Cornell U. Assoc.
Prof.
Susskind, Alex, Ph.D., Michigan State U.
Assoc. Prof.
Tabacchi, Mary H., Ph.D., Purdue U. Assoc.
Prof.
Talbert, Mark, M.P.S., Cornell U. Senior
Lecturer
Thompson, Gary M., Ph.D., Florida State U.
Prof.
Tracey, J. Bruce, Ph.D., SUNY Albany. Assoc.
Prof.
Verma, Robert, Ph.D., U. of Utah, Assoc. Prof.
Walsh, Kate, Ph.D., Boston Coll. Assoc. Prof.
Way, Sean, Ph.D., State U. of New Jersey.
Asst. Prof.
White, Robert, A.O.S., Culinary Inst. of
America. Teaching Support Specialist

COLLEGE OF HUMAN ECOLOGY

ADMINISTRATION

Alan Mathios, dean

S. Kay Obendorf, senior associate dean

Carole Bisogni, associate dean

Darryl Scott, director, admission, student, and career development

Tracey L. Thompson, college registrar

COLLEGE FOCUS

The College of Human Ecology anticipates and responds to human needs in the areas of nutrition and health, economic and social well-being, environmental design and technology; as well as human development through education, basic and applied research, and the extension of knowledge. The college is distinctively characterized by the quality of its research in the natural and social sciences and the design arts, a global perspective in academic programs, a preventive approach to contemporary societal problems, multi-disciplinary departments and programs, development of leadership in students and citizens, and a commitment to diverse populations. Faculty and students examine individuals in relation to their family, neighborhood, workplace, and community, seeking a balance between theory and practice that will improve the quality of everyday life.

FACILITIES

The college is housed in Martha Van Rensselaer (MVR), Savage, Kinzelberg as well as the Biotechnology Building and Weill Hall. The buildings include administrative and faculty offices, classrooms, auditoriums, galleries, and lecture halls; wet chemistry and biochemistry laboratories; design studios and computer-aided design laboratories; woodworking shops; human factors and infant research facilities; and classrooms for distance learning. Also included are learning resource centers for career planning, a historical costume collection, a human metabolic research unit, an animal research facility, cold rooms, a constant temperature and humidity laboratory, and an early childhood research and care program.

Specialized equipment for teaching and research includes biochemical and chemical instruments for spectroscopy, chromatography, radioisotope analysis, electrophoresis, microscopy, and ultracentrifugation; physical testing equipment; and cameras, videotape, and sound recording equipment.

DEGREE PROGRAMS

Human Ecology programs lead to the degrees of bachelor of science (B.S.), master of arts (M.A.), master of science (M.S.), master of

professional studies in human ecology (M.P.S.), master of health administration (M.H.A.), and doctor of philosophy (Ph.D.).

General academic information concerning the bachelor of science degree is given here under "Undergraduate Study." Curricula for major studies are described under the various academic areas.

Programs leading to master and doctoral degrees are administered by the Graduate School. They are described in the *Announcement of the Graduate School* and in announcements published by the individual field offices (Design and Environmental Analysis, Human Development, Nutritional Sciences, Policy Analysis and Management, and Fiber Science & Apparel Design). For information regarding the Sloan Program in Health Services Administration, contact the Department of Policy Analysis and Management.

UNDERGRADUATE DEGREES

Bachelor of science (B.S.) degrees are offered in the following areas:

Biology and society

Design and environmental analysis

Fiber science & apparel design

Human biology, health, and society

Human development

Nutritional sciences

Policy analysis and management

UNDERGRADUATE AFFAIRS

Persons interested in undergraduate study in human ecology should contact the admissions office, 170 MVR (255-5471). Those interested in graduate study should contact the graduate field representative identified among the faculty of each department. Department faculty members are listed at the beginning of the course descriptions for each department.

Counselors in the Office of Admission, Student, and Career Development (170-172 MVR) can help prospective students understand college programs and requirements, as well as college and university resources and services. They provide a broad range of career services and personal support for all matriculated undergraduates. The college registrar and degree auditor (146 MVR) assists undergraduates with questions about academic credit and graduation requirements.

The Student Body

The College of Human Ecology undergraduate enrollment is 1,200. Roughly 400 students graduate each year; last year 275 freshmen and 115 transfer students matriculated. Ninety faculty members serve as advisors to undergraduates.

The college's undergraduate admissions committee selects applicants who are academically well prepared and appear most likely to profit from the college's various curricula. Admission is highly selective. Approximately half of the student body comes from New York State, with the remainder coming from other parts of the United States and abroad. Approximately 30 percent were identified as members of minority groups. Members of the college faculty chair the special committees of approximately 200 graduate students.

Mature Students

The college recognizes that students who interrupted their formal education and are returning to school have needs different from those of younger undergraduates. To facilitate the education of mature students, defined as those 24 years old or older at first matriculation, the college has adopted certain procedures specifically for that group. Counselors in the Office of Student and Career Development (172 MVR) can provide information of interest to mature students. Mature students may be permitted to enroll for as few as 6 credits and also are permitted to extend their residency beyond the normal eight semesters. To find out about qualifying for prorated tuition, mature students must see the college registrar during the course enrollment period in the preceding semester.

Special Students

Students eligible for special status are those visiting from other institutions and interested in particular programs in the college, those with a bachelor's degree who are preparing for graduate study or jobs and careers in human ecology-related fields, or those who have interrupted their education and are considering completing degree programs. Students accepted in the nondegree status of special student may enroll for a maximum of two semesters. During the second semester of attendance, a special student must either apply for admission as a transfer student or plan to terminate studies in the college at the end of the semester. Special students are expected to take a minimum of 12 credits each semester and to take one-half to two-thirds of their work in the statutory divisions of the university. Courses taken while a person is classified as a special student may be counted toward the requirements of the bachelor's degree. Those interested in becoming special students should make appointments to discuss admissions procedures in the Office of Admission (170 MVR, 255-5471).

Empire State Students

Occasionally a student who is completing requirements for a degree through the Empire State College Program is interested in taking a human ecology course. This can be done by registering through the Division of Summer Session, Extramural Study, and Related Programs (B20 Day Hall, 255-4987). All rules

of the extramural division apply, and registrations will be accepted only on a space-available basis and with the written approval of the course instructor. At the time of registration, Empire State College students must provide the extramural division with a completed copy of Empire State College's notification of cross-registration (form number SA-22, F-031) to verify enrollment in Empire State College. Such students will be charged 25 percent of the standard extramural tuition per credit.

Transfer Students

Students may be considered transfer students once they complete 12 college credits after high school graduation. An external transfer student is one who transfers to Human Ecology from an institution outside of Cornell University. Liberal arts credits from other institutions transfer readily, but students must earn a minimum of 60 Cornell credits to graduate. Internal transfer students are admitted to Human Ecology from one of Cornell's other six undergraduate units. Students transferring internally should take special care to learn the policies of Human Ecology, because rules at the various Cornell colleges often differ. Before admission, both internal and external transfer candidates should contact the Office of Admission (170 MVR, 255-5471) to discuss credit transfer. Upon matriculation, admitted transfer students should attend the orientation and contact the Human Ecology registrar's office (146 MVR, 255-2235) to discuss how transfer credits will apply to their specific degree program.

MAJORS

The college requires students to fulfill requirements for a major to graduate. Students must declare a major by the end of the sophomore year. It is common for students to change interests during their undergraduate careers. Counselors in the Office of Student and Career Development (172 MVR), academic advisors, and directors of undergraduate study in each of the academic departments can help students to consider their options and engage in academic planning. All changes of major require submission of the change of major form and are processed through the college registrar's office, 146 MVR. Change of major will trigger re-evaluation of all academic credit and assignment of a new faculty advisor.

DESIGN AND ENVIRONMENTAL ANALYSIS

The Department of Design and Environmental Analysis (DEA) is concerned with planning, designing, and managing the built environment and its effects on human behavior, experience, and the environment itself. The processes for creating, managing, and maintaining the built environment, and the implications for how we live our lives face enormous challenges. These include frequent social and organizational change, technological advances, new building methods, and finite resources. The program in DEA is dedicated to preparing graduates who can help individuals, groups, and organizations meet these challenges.

Diverse faculty backgrounds and teaching approaches help students to develop multidisciplinary problem-solving and creative abilities, aesthetic judgment, and analytical thinking. Students explore innovative concepts for the design and management of interior environments through laboratory, shop, studio, and computer facilities. The relationship between people and their physical surroundings is explored through a combination of academic courses, field experience, and applied research. Examples of student class projects and faculty work are frequently on display in the MVR gallery. The DEA resource center includes books, journals, newsletters, and material samples for student use.

Options

The department offers undergraduate education in three areas: interior design, facility planning and management, and human factors and ergonomics. The interior design option is nationally accredited by the Council for Interior Design Accreditation (CIDA). The Facility Planning and Management Program at Cornell is an IFMA recognized program. This means that it meets the standards for recognition of programs established by the International Facility Management Association.

To take full advantage of the course sequences and electives, it is important to select an option as early as possible. This is particularly true in the interior design option. Transfer students in the interior design option should plan on a minimum of six semesters at Cornell to complete the program.

Option I: Interior Design

This option prepares students for professional careers in interior design. The program emphasizes a design process in which innovative solutions are based on research-derived knowledge of human behavior, values, and attitudes. Students develop an understanding of design theory and methods, design history, behaviorally based programming, and post-occupancy evaluation. They learn about design communication, building systems, furnishings, materials and finishes, and professional practice. Students may use their elective courses to develop a specialization in areas such as design history, historic preservation, theory and criticism, design leadership, interactive multimedia, design sustainability, and behavior-based design.

This program also serves as an excellent preparation for graduate study in interior design, facility management, architecture, and industrial design.

Option II: Facility Planning and Management

This option prepares students for professional careers in facility management. The program focuses on the planning, design, and management of facilities for large, complex organizations such as corporations, health care institutions, research and development laboratories, and universities. Facility planning and management is a basic management function that coordinates and integrates information and expertise from areas such as planning and design, real estate, and business administration with human factors, ergonomics, environmental psychology, telecommunications, and building operations for the purpose of developing and managing

facilities that support individual and organizational effectiveness.

Excellent career opportunities exist in the facility management divisions of private companies, institutions, the health care industry, and with private consulting firms offering facility management services. The program is also a good preparation for graduate study in business, planning, or one of the design disciplines and for advanced study in facility planning and management.

Option III: Human Factors and Ergonomics

This option focuses on the interaction between people, technology, and their physical surroundings. The program seeks to expand understanding of how technology and the environment affects human perception, cognition, motivation, performance, health, safety, and social behavior. This knowledge is then used to help architects, planners, interior and product designers, and facility managers to plan, design, and manage safe and effective environments. This knowledge is also applied to human-computer interaction usability issues. The effect of human capabilities or characteristics such as family structure, life-style, social class, and stage-in-life cycle on environmental needs and requirements is also a focus of the program. Career opportunities are available in software firms, high-technology companies, design firms, and in urban planning and other public agencies as well as in the facility management and product design division of private companies. Human factors and ergonomics is good preparation for graduate study leading to a Ph.D. degree in the social sciences and a career in academic or other research-oriented settings in either the public or private sector. It can also serve as the basis for graduate study in an environmental planning or design discipline such as architecture, facility planning and management, interior design, landscape architecture, or city and regional planning. Electives in the social sciences and in research methods and statistics are encouraged.

Academic Advising

All DEA majors are matched with a faculty advisor during their first semester by the director of undergraduate studies.

Consultation with faculty advisors about future goals, departmental requirements, sequences of courses, and electives inside or outside the college helps students develop their programs. Students majoring in interior design, especially, must begin early to plan and collect materials for a portfolio of their work, which is necessary for many positions and for application to graduate schools. Faculty advisors can make recommendations on what to include. Students are free to change advisors. Although advisors should be consulted about students' schedules during course enrollment each semester, it is the student's responsibility to keep track of his or her courses and to make sure that they meet graduation requirements for their major and college.

Ownership and Exhibition of Student Work

All design work done in studios as part of an academic program is the property of the department until it has been released by the instructor. The department is not responsible for loss or theft of student work.

FIBER SCIENCE & APPAREL DESIGN

The Fiber Science & Apparel Design (FSAD) major is unique in the Ivy League, combining a strong liberal arts foundation with excellent training in apparel and textiles. FSAD offers a broad range of courses, from the art of designing clothing and accessories, to the business of manufacturing and marketing them internationally, to the science of textiles and fibers.

All FSAD students receive an introductory exposure to the basics of textiles and design. Students then choose one of three options that emphasize the application of design principles, management and marketing, or the physical and material sciences. Students may combine courses from more than one option if they choose.

Academic course work is further enhanced by field and international experiences, and significant opportunities to do independent projects for credit with individual faculty members. Gallery space provides the setting to display design work. In addition, the Cornell University Costume Collection, housed in the department, provides a valuable resource; items from the collection are made available to students for classroom and special study use.

Academic Advising

All FSAD majors are matched with a faculty advisor by the director of undergraduate studies, Professor Charlotte Jirousek. Students are strongly urged to discuss their goals, course selection and sequence, electives, and career plans with their faculty advisor. Students in apparel design must begin working with their advisors early to develop a professional portfolio of their work. Students are free to change advisors; changes must be recorded with the director of undergraduate studies. Although advisors oversee course selection for the following semester, it is the student's responsibility to keep track of his or her courses and to make sure that the program meets graduation requirements for his or her major and college.

Student Work

All apparel design work done as part of the academic program will be held by the department until it has been released by the instructor. Certain exceptional work may be used by the department to exhibit for academic purposes. The department is not responsible for the loss or theft of student work.

Course Fees

No grade will be given in a course unless the course fee has been paid and equipment returned by the last week of classes.

Options

Students may select options in apparel design, apparel/textile management, or fiber science. Most transfer students will need at least one extra semester to fulfill the requirements of the major. Transfers in the design option should plan on two additional semesters.

Option I: Apparel Design

The Apparel Design option relates the human need for fashionable and functional clothing and accessories to design principles and to the physical properties of textiles. Students

take a sequence of studio courses, focusing on the manipulation by hand, eye, and computer of form, color, and fabric, as well as courses in the social, economic, historical, and cultural aspects of design. Many students participate in design competitions sponsored by the fashion industry.

Option II: Apparel/Textile Management

The Apparel and Textile Management option applies management and marketing principles to industry and consumer issues in this sector of the economy. Courses focus on the processes used to develop, manufacture, and distribute apparel and textile products and examine topics such as business organizational structures, globalization, product development, communication, advertising and marketing, and entrepreneurship. Students combine theory with case studies to find solutions to everyday problems.

Option III: Fiber Science

The Fiber Science option teaches the physical, chemical, and engineering properties of fibrous materials, advanced engineering composites, geotextiles, and protective clothing, as well as the more traditional applications found in apparel interiors. The fiber science option provides a strong base in mathematics and the physical sciences combined with supporting courses in engineering, consumer economics, and the social sciences.

Career Opportunities

Graduates of programs in the Department of Fiber Science & Apparel Design have found challenging employment within the apparel and textile sector, in independent and government-sponsored research, and in community organizations. In addition, the program prepares students for graduate or professional study in apparel design, apparel or textile marketing, business and management, or fiber/polymer science. Some students continue professional study in law or medical school.

Apparel students design for influential fashion houses and under their own labels. Graduates also do specialized design in fields such as military, athletics, and public safety; create innovative clothing for special populations such as children, senior citizens, and the physically challenged; and use their creativity in public-relations firms, theater, publishing, and promotion.

Graduates of the Apparel and Textile Management program are attractive candidates for leadership positions in fashion and other industries. Students who go on to graduate work are well prepared for advanced programs in fields such as business administration, marketing, economics, law, textiles, communication arts, and education.

Recent graduates of the Fiber Science program have begun careers in the fiber and textile industries as well as with government agencies developing and evaluating new products, conducting research, providing technical services, helping to ensure product safety, and coordinating consumer information programs.

HUMAN BIOLOGY, HEALTH, AND SOCIETY

The human biology, health, and society (HBHS) program permits students to combine their interests in the biological sciences while exploring human health issues from the perspectives of both the biological and behavioral sciences. HBHS majors select the issues they want to explore in depth from Human Ecology courses that address health and the broad range of factors that influence human well-being. Issues that can be explored include biology and behavior; metabolism, genetics, and health; biology, growth, and development; and food and health policy and health promotion. Most students in this program will proceed to programs of advanced study to pursue careers related to health. This major is offered by faculty in the Division of Nutritional Sciences. More information about this program can be found in a separate section of the catalog that describes the division's programs.

HUMAN DEVELOPMENT

The field of human development covers the entire life span and has benefited from the contributions of many disciplines. Human development majors explore the psychological, social, cultural, and biological development of people from conception to old age, focusing on the processes and mechanisms of growth and change over the life course. An important emphasis is the role that social institutions such as schools, workplaces, and neighborhoods play in human development, as well as the influence that developing people have on their environments. The human development major provides an excellent foundation for many professional careers, such as law, medicine (pediatrics, geriatrics, and psychiatry), clinical psychology and other mental health professions, education, social work, other health-related professions, business, nonprofit management, and advocacy. Many human development graduates attend graduate school in the fields of human development, psychology, and sociology.

Classes in human development cover a wide range of issues and approaches, and are organized into six different areas: social and personality development; cognitive development; human developmental behavioral neuroscience; aging and health; law, psychology and human development; and group disparities in development. The faculty in the Department of Human Development come from multiple disciplines, including developmental psychology, neuroscience, clinical psychology, education, and sociology. The research of the department's faculty is extensive and world renowned and includes issues such as the neurobiological basis of personality, the role of childhood attachments in the development of adult romantic relationships, the acquisition of language in infants, the effects of environmental stressors on children's cognitive development, interventions to prevent and mitigate the impacts of child maltreatment, risk-taking during adolescence, risk and resilience factors affecting reactivity to stress across the life course, the epidemiology of elder mistreatment, memory and the legal system, health care decision making among older

people, and strategies to prevent social isolation and promote social integration among older people.

Curriculum

Human development is one of the most diverse majors in the College of Human Ecology. While all students learn the fundamentals of human development, students also focus on one or more areas of particular interest (e.g., social and personality development, aging and health; law, psychology, and human development). The major is flexible enough to give students ample opportunity to meet the requirements for admission to professional degree programs, including medical, dental, law, public health, social work, and business schools. Requirements specified by the College of Human Ecology make up part of each student's curriculum, and include classes in the social and natural sciences, humanities, and writing. To fulfill department and college requirements, Human Development majors must take at least one biology course with lab (two biology courses with lab are strongly recommended), and statistics.

Special Opportunities

Beyond the required formal course work, students in human development have many other opportunities that involve ongoing individual work with Cornell faculty or other professionals. Academic credit can be earned through all of them, up to the limit specified by the college (with some restrictions noted below).

Laboratory courses. Human development students may earn credit toward the major by taking formal courses designed to teach laboratory and other research techniques, including study design, data collection, and data analysis. Students may count one of these courses toward the credits required for the Human Development major. Additional elective credits can be earned toward graduation by enrolling in individual faculty research programs, as described below

Faculty research. Many human development students work for several semesters as research assistants on faculty projects. On these projects, students get further training in research techniques such as laboratory experiments, surveys, and scientific behavioral observation. Participation in faculty research provides the type of experience that many graduate and professional schools expect from their top applicants. Recent projects involving students have included (1) language acquisition among infants in bilingual households or settings; (2) experimental studies of risky decision-making among teens; and (3) the impact of poverty on stress responses in children and teens. Participation in faculty research for credit counts as elective credits toward graduation in the College of Human Ecology (up to the limit specified by the college).

Independent research. Under faculty supervision, some advanced students complete an honors thesis. Applications to enter the honors program are due in the first semester of the junior year. Honors theses typically involve a topic related to faculty research, and all applicants must have experience working on research projects, as well as meet other program requirements. Seniors in the honors program register for an

honors seminar and for honors thesis credits. The seminar and honors thesis credits count as elective credits toward graduation in the college (up to limit specified by the college).

Field Placements. Human development majors can arrange internships with Urban Semester in New York City, Cornell in Washington, and Cornell Abroad programs. Students may also arrange internships during the fall and spring semesters in the Ithaca area. All such field placements are required to be under the supervision of a human development faculty member. In recent years, Human development students have participated in projects with the Tompkins County Office on Aging, the Tompkins County Human Service Coalition, Kendal of Ithaca, local schools, the Tompkins County Youth Bureau, and the Law Guardian's Office of Tompkins County. Summer internship credit is not allowed in Human Development unless the student is enrolled for Cornell University credit over the summer. Field Placement credits count as elective credits toward graduation (up to the limit specified by the college).

Undergraduate Teaching Assistant.

Advanced students can serve as undergraduate teaching assistants. The teaching assistantship requires work with the professor teaching the course as well as contact with students. Undergraduate teaching assistantships are for-credit only. Teaching assistantship credits count as elective credits toward graduation (up to the limit specified by the college).

Teaching Certification. A cooperative education program exists between the Department of Human Development and Wells College. This program requires careful planning and course scheduling. It enables students to graduate with a Cornell bachelor's degree and New York State Certification to teach nursery school through sixth grade. This certification is honored by most other states.

The program requires a minimum of a three-semester commitment. Cornell HD students take four courses at Wells College and student teach their last semester at Cornell. Although there is van transportation between Cornell and Wells College, it is important for students to have access to a car, especially while student teaching. Students will be registered at Cornell during the entire undergraduate program and usually maintain Ithaca housing. Wells College courses count as Cornell courses and are used as electives but are not included in a student's GPA. The one-semester student teaching experience is typically based in the Ithaca area, though not necessarily within the city of Ithaca.

This program is open to HD majors only. Students must have at least a 3.0 Cornell cumulative GPA upon application and must maintain a 3.0 GPA to qualify for student teaching and to complete the program. For more information, contact Judith Ross-Bernstein in G56 MVR at 255-0826.

NUTRITIONAL SCIENCES

A major in nutritional sciences (NS) focuses on the complex interrelationships of food patterns, nutritional status, and health. This field draws upon chemistry, biology, and the social sciences to understand questions such as: How are nutrients used by the body? What factors influence human food choice? What

nutrients and dietary patterns are recommended to promote growth, maintain health, or reduce the risk of chronic disease? Students in this program may also fulfill the courses required for didactic training in dietetics toward registration as a dietitian (R.D.), which will enable them to be employed as nutrition counselors, clinical nutritionists, sports nutritionists, or administrators of food and nutrition services. Students also may prepare for medical school and other types of advanced degree programs through this major. The requirements for this program are outlined in the "Nutritional Sciences" section of this catalog.

Special Opportunities

Dietetics and Clinical Nutrition

Students who wish to work in the areas of clinical nutrition, nutrition counseling, sports nutrition, community, nutrition, or food and nutrition management should complete the academic requirements for The American Dietetic Association (ADA). The Didactic Program in Dietetics is accredited by the Commission on Accreditation of Dietetics Education and provides students with the coursework necessary for application to an accredited Dietetic internship or an Approved Pre-professional Practice (AP4) program. Students successfully completing didactic program requirements at Cornell are issued a Verification Statement. A one time fee is involved to cover the cost of program materials and transcript evaluation. The Didactic Program in Dietetics policy and procedure for issuing verification statements can be found at nutrition.cornell.edu/dns7_dietetic.html. Upon completion of a Dietetic Internship or AP4 program, students are eligible to take the Registered Examination of the Commission on Dietetic Registration, and become a Registered Dietitian (RD).

Courses in foods, nutrition and disease, microbiology, management, statistics, and nutritional care are added to the courses required for the nutrition programs. For additional information about meeting ADA requirements, contact the DNS academic affairs office, B19 Savage Hall, 255-2628.

Exercise Science Minor

Students can complete the Applied Exercise Science Concentration at Ithaca College, which includes courses in kinesiology, exercise physiology, and biomechanics of human movement. Nutrition courses of special interest relate to growth and development, regulation of body weight, and community nutrition and health. For information about the Applied Exercise Science Concentration, contact the DNS academic affairs office, B21 Savage Hall, 255-4410.

POLICY ANALYSIS AND MANAGEMENT

The policy analysis and management (PAM) major produces graduates skilled in policy analysis and management skills applicable to the public, nonprofit, and private sectors. The PAM graduate will have concentrated knowledge in policy areas such as family/social welfare, health, or market regulation. Graduates are well-qualified for a wide variety of public, not-for-profit, and private sector employment emphasizing either policy

analysis or managerial decision making. The major attracts large numbers of pre-law students, pre-M.B.A. students, and students intending to pursue graduate studies in economics, sociology, and public policy. The potential exists to pursue a five-year program resulting in a B.S. and a Master of Health Administration through the Sloan Program.

The PAM major combines theoretical underpinnings from economics, sociology, psychology, demography, and government to critique and analyze U.S. domestic policies and programs. It provides students with knowledge to build management skills for use in the public, not-for-profit, and for-profit sectors of the economy. Ideas of social justice, equity, and economic efficiency will be studied. Research methods, statistics, and multivariate statistics will be taught and applied to program evaluation, policy analysis, and management.

In addition to learning basic policy analysis and management skills, the student will be expected to apply these skills within particular areas of policy focus. Upper-level family/social welfare courses cover a panoply of governmental and private sector income maintenance, social, and human service delivery programs and policies that range from child adoption, neglect, and abuse policies and antipoverty programs to policies and programs that impinge on or regulate marriage, divorce, and fertility. Upper-level health policy courses cover programs and issues such as health care access, the Medicare and Medicaid programs, long-term care, managed care, public health issues such as obesity, and substance abuse policies. Upper-level market regulation courses cover programs and policies governing the regulation of advertising, the regulations of financial institutions, risk and insurance markets, food and drug safety, and public utility markets. They also deal with issues such as privacy, the Internet, and television.

In addition to meeting college requirements, all PAM majors are expected to take the following core courses: Introductory and Intermediate Policy Analysis, Demography and Family Policy, Multivariate Statistics, Intermediate Microeconomics, and Public Sector Economics. Multivariate Statistics and Intermediate Microeconomics must be completed by the second semester of the sophomore year.

PAM Honors Program

The honors program, which leads to a B.S. degree with honors in Policy Analysis and Management, gives official recognition to students who have demonstrated excellence in their academic work and their capacity for independent research. In addition to fulfilling the requirements for the major, students in the honors program will participate in an honors seminar and prepare an honors thesis. Honors students work with a research mentor in preparing for their thesis. Interested students should obtain a PAM Honors Program application form from the PAM Undergraduate Office (122 MVR). For more information, students should contact the PAM director of undergraduate studies.

INTERDEPARTMENTAL MAJOR IN BIOLOGY AND SOCIETY

Biology and society is a multidisciplinary program for students with special interests in such problems as genetic engineering, environmental quality, food and population, the right to medical care, and the relation between biology, society, and ethics and/or public policy. It is also designed for students who plan postgraduate study in management, health, medicine, law, or other related fields.

Because the biology and society major is multidisciplinary, students must attain a basic understanding of each of the several disciplines it comprises, by including courses in the fields of biology, humanities, social sciences, and mathematics. In addition, majors take core courses in biology and society, a set of electives, and a special senior seminar.

Course work in the College of Human Ecology may be selected from concentrations in human development, health, or social policy and human services. The other basic requirements of the college must also be met. Programs incorporating those required courses are designed in consultation with a faculty advisor to accommodate each student's individual goals and interests. For further information on the major, including courses of related interest, specific course requirements, and application procedures, see Nancy Breen, director of undergraduate studies, in 205 MVR.

SPECIAL OPPORTUNITIES

Study Abroad

Each year over 75 Human Ecology students spend a semester or more off campus in places spanning the globe, such as Australia and Zaire. There they supplement their Cornell studies with a wide range of cross-cultural and academic experiences. Study abroad opportunities are available through Cornell-sponsored programs and other U.S. college-sponsored programs as well as by direct enrollment at foreign universities.

Residency Requirements

All study abroad students must meet college study abroad requirements and remain registered at Cornell during the overseas study. Credits earned count toward the 60 Cornell credits required for graduation (in unusual circumstances some credits earned abroad may be considered as transfer credit).

Requirements for College Approval

1. GPA of 3.0 or higher, good academic standing, and well-articulated goals for students' study abroad semester.
2. Completion of the Cornell application; applications from individual programs also must be submitted to Cornell.
3. Completion of the equivalent of 15 semester credits per semester while abroad.
4. Courses taken for a letter grade (unless course is offered with only an S-U option).
5. Submission of a petition by second-semester seniors going abroad.

Application Process

Typically, students considering study abroad begin their planning at least a year before the semester abroad. Students should carefully consider what they hope to get out of a study abroad experience (academically and culturally) when investigating program options. Resources can be found in the Cornell Abroad office (300 Caldwell Hall), through the Human Ecology study abroad advisor (170 MVR), or in the Human Ecology Career Development Center (162 MVR). Completed applications must be submitted to the Human Ecology registrar's office by the following dates:

Fall and year deadlines: February 1

Spring deadline: September 15

Some programs will be filled by these dates. Use of the early deadlines is strongly recommended. These are:

Fall and year deadlines: December 15

Spring deadline: May 1

Approved applications will be signed and forwarded to the respective programs through the Cornell Abroad office.

Credits Abroad and Transfer of Credit

Most study abroad courses are transferred to the Cornell degree program as electives or liberal arts distribution credit. Study abroad credit awarded toward one's major is much less common and must be approved via signature of the student's department advising coordinator on the Cornell application. Credit for study abroad will be awarded only after successful completion of the semester abroad (marks equivalent to a Cornell grade of C or higher) and receipt of the official transcript by the college. Official transcripts should be sent to the Cornell Abroad office, which will process and forward them to the Human Ecology registrar.

Courses must be pre-approved before the student's departure. Any variances must be cleared with Human Ecology. Students must include a foreign language course in the country's native language if studying in a country where English is not the native language. All courses taken abroad and grades received will appear on the Cornell transcript. Grades earned do not, however, become part of the Cornell GPA. Students should save all written work from all classes until courses are officially transferred.

Independent Research

Research opportunities for undergraduates are extensive and valued as an important part of the learning experience. The opportunity to engage in substantive research with some of the leading scientists in their fields is so compelling that approximately half of the college's undergraduates conduct research projects. Students may become involved in research with the guidance of faculty members by conducting research assigned in a class, joining a faculty member's research group, completing an independent study research project, or carrying out an honors program project.

For further information, students should contact individual faculty members or the director of undergraduate studies (DUS) in their department.

Honors Programs

Students interested in college honors programs that lead to the degree “bachelor of science with honors” usually apply to the appropriate honors committee no later than the end of the first semester of their junior year. A minimum GPA of 3.3 and demonstrated potential for honors-level research is required. Students take approved courses in research methodology and evaluation, attend honors seminars, complete a written thesis, and defend it in an oral examination.

In addition to the college honors program, special programs are offered by the Department of Design and Environmental Analysis, the Department of Fiber Science & Apparel Design, the Department of Human Development, the Department of Policy Analysis and Management, and the Division of Nutritional Sciences.

Students who are interested in the honors program should contact the director of undergraduate studies (DUS) in their department or division for information and guidelines.

Field Study and Internships

Field study and internships provide experiential learning opportunities in real-life circumstances where classroom knowledge is tested and applied. Students are able to master new skills, develop and implement plans of action, solve problems, interact in multicultural situations, and build networks for future job opportunities. By applying techniques of research methods, critical thinking, and self-directed learning, students learn to think conceptually while becoming agents of change.

Check with the director of undergraduate studies for major specific information. The Career Development Center (162 MVR) and career counselors in 172 MVR also can provide resources and assistance in finding internships and other experiential opportunities.

Concentration/Certificate in Gerontology

For students interested in pursuing study related to aging, the College of Human Ecology, under the auspices of the Bronfenbrenner Life Course Center, offers the option of completing an undergraduate concentration in gerontology. This program is designed to develop an understanding of and competence in dealing with the processes and issues of aging. Study in gerontology enriches the practical experience of students and prepares them for professional work in this area. The program draws on the resources of several departments and colleges at Cornell and Ithaca College to shape a curriculum suited to each student’s professional goals and interests.

The concentration is available in combination with any major offered by the university. Twelve credit hours of course work must be completed, with 9 of these taken in the College of Human Ecology. The courses explore aging through biology, psychology, sociology, economics, and design.

Experiential learning opportunities are strongly recommended as a complement to classroom work. With faculty sponsorship,

students can participate in experiences in the Ithaca area, the Urban Semester in New York City, Cornell in Washington, the Capital Semester, or in a placement arranged more individually.

Both Cornell and Ithaca College offer courses that incorporate a service-learning component into their curriculum. Cornell’s course *Environments for Elders* (DEA 4720) involves service in local agencies (e.g., local nursing homes, Office of Aging, assisted-living facilities), where students gain valuable experience. Students may also join the “Elderly Partnership” through the Cornell Public Service Center to participate in local visits to elders. There also are opportunities for undergraduates to become involved in research projects examining topics such as residential changes and adjustments in the later years, nutrition and elders, social security, and design for people with dementia. In addition, senior students can apply to work as a teaching assistant for a gerontology course.

Departments and programs have designated academic advisors for the gerontology concentration who will help students plan the sequences of courses and electives needed to complete both a major and the gerontology concentration. Because many gerontology courses have prerequisites, early and careful planning is essential.

Specific program requirements may be obtained in the Human Ecology registrar’s office (146 MVR, 255-2235) or from Nancy Wells, Bronfenbrenner Life Course Center (E220 MVR, 254-6330).

Concentrations

The College of Human Ecology formally recognizes as concentrations computer information sciences and international relations (both administered by the College of Arts and Sciences) and the previously described concentration in gerontology (administered by the College of Human Ecology). Students interested in pursuing these concentrations should inquire with the college department offering them. If successfully completed before graduation, these concentrations will be posted as part of the student’s official transcript.

Students may develop an unofficial concentration in additional fields taught at Cornell by taking 12 credits in an approved area. Africana studies, communications, and business are just a few examples of concentrations that are possible. While these unofficial concentrations are not part of a student’s transcript, students may choose to publicize these concentrations on their personal résumés.

Minors

A student may pursue a minor in any department in any college that offers them, subject to limitations placed by the department offering the minor or by the student’s major. Completed minors will appear on the student’s transcript. Not all departments offer minors. Consult the appropriate section in this catalog or contact the appropriate department for information on minors offered and how to pursue a minor.

THE URBAN SEMESTER PROGRAM IN NEW YORK CITY

Multicultural Issues in Urban Affairs

Sam Beck, Ph.D., director

The Urban Semester Program is a set of courses spanning the entire year. Students choose either fall or spring semester and enroll in three classes focusing on the opportunities and barriers that a multicultural society presents and their relationship with professional, community, or public policy settings and concerns (15-credit residential program). They also intern three days each week in placements of their choosing. One day each week, students carry out community service in an inner city school (pre-K to high school). One day each week, students participate in site visits. Seminars are incorporated into these activities. All students reside in the Olin Hall dormitory of the Weill Medical College of Cornell University.

In the eight-week summer semester (1 to 3 credits), students carry out internships in various settings. Students work with the program staff to locate internship placements. For information, contact the Urban Semester Program staff in 162 MVR, 255-1846, or the Urban Semester Program in New York City at 212-746-2273.

New York City offers a wide variety of internship settings. Many bilingual and bicultural internship settings are available in Chinese, Spanish, Creole, Russian, Yiddish, and other languages. Examples of internships follow:

Health and medicine—New York Presbyterian Hospital/New York Weill Cornell Medical Center, Queens Medical Center for Women and Children, South Bronx Health Center for Children and Families, Memorial Sloan Kettering Hospital, Hospital for Special Surgery, Montefiore Hospital, Bellevue Hospital, Our Lady of Mercy Hospital

Private and public law—NOW Legal Defense and Education Fund, Agenda for Children Tomorrow, Skadden Arps, Slate, Meagher & Flom, Lawyers for Children, DA’s Office, Legal Aid Society, AALDEF, Committee Against Anti-Asian Violence, Center for Immigrant Rights, NAACP/PLDEF, Dorsey & Whitney

Government and community agencies—Cornell University Cooperative Extension, Senator Charles Schumer’s office, NYC Housing Authority, Dept. of Aging, Women’s Action Alliance, NYC Commission on the Status of Women, NYC Dept. of Consumer Affairs, The Center for Puerto Rican Studies, Manhattan Borough President’s office, Central Park Wildlife Center, Attorney General’s office, The Parks Dept., Health Dept.

Wall Street firms and other private businesses—Bloomingdales, Prudential Securities, Merrill Lynch, PricewaterhouseCoopers, Cairns & Associates, Burson Marsteller, Cushman & Wakefield, AIG-AI Underwriters, Salomon Smith Barney, Jane Clark Chermayeff Associates, DDB Needham, KCSA, William M. Mercer Consulting Co., MGM, Madison Square Garden, Gensler Architecture, Niedeffhoffer-Henkel Century Group, American Management Association

Private not-for-profit organizations—City Lights Youth, Council on Economic Priorities, Planned Parenthood, Talbot Perkins, FEGS, National Resources Defense Council, Urban Youth Alliance Inc., Phipps Housing, The Door, Covenant House, Global Policy and International Law, UN International Assoc. of Religious Freedom, Mothers and Others for a Livable Planet, UN Child Care Center, WHEDCO, YAI, Families and Work Institute

Private and public schools—Beginning with Children, Banana Kelly High School, East Harlem School at Exodus House, The Hetrick Martin Institute, Nuestros Niños, Theodore Roosevelt High School, The Choir Academy of Harlem, El Puente, Genesis RFK Center, River East School, MS 118, Mott Haven Village

Design and arts organizations—Harlem Textiles Works, TADA!, NY Theater Workshop, Cynthia Rowley, Inc., Perry Ellis International, Museum of African Art, SOHO20 Gallery, Lower East Side Tenement Museum, Tommy Hilfiger, Polo, The Gap, Liz Claiborne

Communications and media—Nickelodeon, *Do Something* magazine, NBC *Dateline*, CNN, CBS News—48 Hours, NBC News, ABC *One Life to Live*, MSNBC *The News w/Brian Williams*, *The Village Voice*, *Good Housekeeping*, *The New Yorker*, *Essence*, Children's Television Workshop, *Good Morning America*, MTV, HarperCollins Publishing, *Maxim Magazine*, MTV Online International

Other Off-Campus Programs

Capital Semester

Richard Canfield, Ph.D., director

Combine a full semester of 15 Cornell credits with a paid internship and a reduction in tuition. Students intern directly for a New York State legislator (Senate or Assembly) in Albany to explore their policy interests in greater depth. Interns attend hearings and legislative sessions, meet with lobbyists and constituents, write reports for legislation and possible publication, and generally help conduct the work of their legislator. All Cornell students, regardless of major, are encouraged to apply. The program is available during the spring semester only, and it is open to sophomores, juniors, and seniors. Interns benefit greatly when subsequently applying for future employment, law school, graduate school, or business school. Information is available from the Career Development Center (162 MVR), and applications and further information can be obtained from Richard Canfield (B09 Savage Hall, RLC5@cornell.edu).

Cornell in Washington

Students take courses from Cornell faculty, conduct individual research projects, and work as externs while taking advantage of the rich resources of the nation's capital. For more information, visit the program office (M101 McGraw Hall).

Courses at Ithaca College and Wells College

Full-time undergraduate students at Cornell may petition to enroll in courses at Ithaca or Wells College. Students pay regular full tuition to Cornell and only special fees to either Ithaca or Wells where applicable. Students are allowed to register for one course per semester and a maximum of 12 credits in four years. Exceptions will be granted to Cornell

students enrolled in methods and practice teaching courses at Ithaca and Wells, and those students pursuing a concentration in exercise science through a specially arranged program with Ithaca College.

Cornell students are eligible to register only for Ithaca and Wells College courses that are relevant to their program and that do not duplicate Cornell courses. Ithaca and Wells College credit counts as Cornell credit but not as Human Ecology credit. Students are accepted on a space-available basis. Participation in this program is not guaranteed, and both Ithaca and Wells have the right to accept or reject students for any reason deemed appropriate. The program is available only during the fall and spring semesters. For further information, contact the college registrar (146 MVR, 255-2235).

Double-Registration Programs

Cornell undergraduates from PAM and other fields across the college and campus are eligible to apply to the Sloan Program in their junior year for a five-year accelerated B.S./M.H.A. degree in health administration. In their senior year, these students will take the first-year Sloan courses, which will be counted twice to satisfy both undergraduate as well as graduate requirements. At the end of their senior year, students will graduate with a B.S. degree. Students whose grades are competitive will be notified during the spring semester of their senior year that they are invited to continue for the final year of Sloan as a graduate student. Those students accepted for the five-year program will participate in a health care administrative internship during the summer after earning their B.S. degree and following the first year of Sloan academic course work. The following graduate year they will complete the second year of required Sloan courses and electives and will earn a master in professional studies, with Cornell certifying completion of the requirements for a graduate degree in health administration.

Students applying to the accelerated B.S./M.H.A. program need to complete the initial application to the Sloan five-year program through PAM in their junior year. In general, at the time of application, most of their undergraduate requirements will have been met. This application must include the GRE general test score, along with recommendations from the faculty advisor and at least one other source, as well as transcripts and the statement of purpose. During their final senior undergraduate year they also will have to submit a formal application to the graduate school. A sample schedule of the two-year curriculum for Sloan can be viewed at www.human.cornell.edu/pam/sloan/current_students/Academics.cfm.

Double-Registration Program for Law

A small number of highly qualified applicants may be admitted to the Cornell Law School after only three years of undergraduate education. The requirements for admission under these circumstances are more stringent than for acceptance after four years of undergraduate study. Applicants must present outstanding qualifications and strong professional motivation. The junior year applicant follows the ordinary application procedures for Cornell Law School admission.

Interested students should contact the Law School director of admissions (Myron Taylor

Hall, 255-5141) to discuss the admissions criteria. Because students accepted to this program will be spending their senior year away from Human Ecology, they need to plan ahead to ensure that distribution and major requirements for the B.S. degree will be met. Successful applicants need the approval of the college registrar in Human Ecology.

ACADEMIC ADVISING AND STUDENT SERVICES

Faculty Advisors

Students are assigned a faculty advisor in the department of their major. Students may change advisors by working with the director of undergraduate studies (DUS) in their major.

Faculty advisors are available to discuss course requirements and sequences, useful electives inside or outside the college, as well as future goals and career opportunities. It is the student's responsibility to make sure that his or her course selections meet graduation requirements for the major, the college, and the university. Directors of undergraduate studies in each department are available to answer questions about the advising system and the undergraduate major. Students who are exploring alternative majors should work closely with college counselors in the Office of Admission, Student, and Career Development.

Office of Admission, Student, and Career Development

The Office of Admission, Student, and Career Development (ASCD) (170-172 MVR) is a center for undergraduate freshman and transfer admission activities; student orientation activities; academic, personal, and career advising; study abroad; and multicultural student programs.

Personal counseling, including exploration of problems or concerns of a personal nature, is available to all students. These ASCD counselors, however, are not psychiatrists or therapists; they are available to help students understand and navigate the Cornell system, and to offer advice, support, assistance, and referral. Discussions are completely confidential. Appointments may be made through the receptionist in ASCD or by calling 255-2532.

In addition, ASCD provides advising support for several student organizations, including Human Ecology Ambassadors, the Mature Students Association, the Association for Students of Color, the Pre-professional Association toward Careers in Health, the Pre-law Undergraduate Society, and the Orientation Committee. Primary responsibilities of the office are listed below:

Academic advisement. This service is provided to all students as an adjunct to faculty advising. Counselors assist in course scheduling, academic planning, selection of a major, graduation requirements, and related issues.

Undeclared majors. Students who have not yet declared a major work closely with counselors in the Office of Student and Career Development, 172 MVR. We encourage students to explore interests by taking courses in several Human Ecology departments

If you have general ideas about what you would like to study, or what you would like to do after college, then you have probably already narrowed your choice of majors. If you have, then choosing one of those majors as a tentative first home in the college makes a lot of sense.

- You will be assigned a faculty advisor by your department.
- You will receive departmental invitations and communications.
- You may change your major at any time.

Career counseling. Career counseling is designed to help students clarify the relationship between personal skills, abilities, and career goals. Services are offered on an individual or group basis. Counselors assist in identifying career outcomes of the majors, developing networking skills, suggesting course work appropriate to various career goals, and assisting students in their general internship and job searches.

Post-graduate advisement. Material and advice pertaining to graduate and professional schools, graduate entrance examinations, courses of study, and career outcomes is readily available.

Students with disabilities. The College of Human Ecology is committed to assisting students with disabilities; accommodations are available to students who have registered with the Office of Student Disability Services (420 CCC). You are encouraged to contact SDS before your arrival on campus in order to arrange services in time for your first semester. Support within the college is available through the Office of Student and Career Development, 172 MVR.

Financial aid. Students who encounter financial difficulty or anticipate running short of funds may discuss their needs with a counselor. Complete information is available from the Office of Financial Aid, 203 Day Hall.

The Human Ecology Alumni Association Student Grants. Students in the college can apply for these competitive grants to further their academic interests through independent research, community outreach, conference travel, and limited summer study related to career preparation/professional development. Applications are available on the college web site.

Office of the Registrar

The Office of the University Registrar (B7 Day Hall) maintains the official academic records for the university and provides students with their official university transcripts. Additional information is available on the university registrar's web site: <http://registrar.sas.cornell.edu>. The college registrar (146 MVR) maintains students' official academic records, including the audit of progress toward the degree. The college registrar also provides services such as adding and dropping courses, correcting student records, and approving the transfer of credit from other institutions. Additional information is available on the HE registrar's web site: www.human.cornell.edu/che/Academics/undergraduate/Student_Services/Registrar/.

Multicultural Programs

The College of Human Ecology at Cornell University believes that a diverse community enriches the educational process for all members of the college community. Consequently, the college focuses particular efforts on a broad range of services for students of color. This includes not only recruitment but also services for students already on campus. Additionally, the college collaborates with university and New York State programs to assure that Human Ecology students have access to the vast array of services available here.

The professional staff of Human Ecology's Office of Admission, Student, and Career Development includes a director of multicultural programs who assists in the recruitment, admission, and enrollment of the most qualified and appropriate EOP (a program for New York State residents), African American, Native American, Hispanic American, and Asian American students to the college. All accepted EOP students are invited to a special university-wide pre-freshman summer program that introduces accepted students to the Cornell campus and its classrooms. Services for current students include EOP/COSEP; academic, career, and personal counseling; recommendation letters for employment or graduate schools; and advising and support for student activities and programs.

Human Ecology Peer Partnership Program

helps incoming students of color transition to the college and university. Small groups of freshmen, usually about six to eight students, are paired with faculty and upper-class students. They meet weekly for discussions, guidance, and explorations of the Cornell campus and the Ithaca community. For more information, contact Verdene Lee in the Office of Student and Career Development (172 MVR, 255-2532); or Gary Evans (E306 MVR, 255-4775); or Lorraine Maxwell (E310 MVR, 255-1958), both in the Department of Design and Environmental Analysis.

ASC (Association for Students of Color). With the motto "Yesterday's vision, today's reality, and tomorrow's hope," the ASC was created to bring together Human Ecology students to provide a supportive foundation for enrollment, retention, graduation, and career placement for students of color. The goals of the ASC are to increase communication between students of color, administration, and faculty; assist in increasing enrollment of students of color in Human Ecology; and assist in increasing the retention of students of color in Human Ecology and in their selected majors. ASC's two committees are recruitment/retention and career development. For more information, contact Verdene Lee (172 MVR, 255-2532).

CSTEP. The Collegiate Science and Technology Entry Program is the New York State program that provides enrichment activities for pre-med and pre-law New York State residents. Services are targeted at populations who are historically underrepresented in scientific, technical, health-related, or licensed professions and/or who are economically disadvantaged and who demonstrate interest in, and potential for, a CSTEP-targeted profession. For more information, contact Verdene Lee in the Office of Student and Career Development (172 MVR, 255-2532).

BBMTA (Black Biomedical and Technical Association). A university organization that provides enrichment activities for minority students interested in pursuing health careers. For more information, contact Janice Turner (55 Goldwin Smith Hall, 255-9497).

Multicultural Education

Multicultural education broadens understanding of the world's many different societies as well as the various cultures of this country. Students take courses in the Cornell programs listed below that may be used to meet degree requirements. The college encourages students to incorporate courses from these cultural programs and from study abroad experiences in their degree programs. See information on study abroad opportunities.

Africana Studies and Research Center
 American Indian Program
 Asian American Studies Program
 East Asia Program
 Feminist, Gender, and Sexuality Studies Program
 Gender and Global Change
 Institute for European Studies
 Languages and Linguistics
 Latin American Studies Program
 Latino Studies Program
 Peace Studies Program
 Program for Contemporary Near Eastern Studies
 Program in Jewish Studies
 Religious Studies
 South Asia Program
 Southeast Asia Program

International Students

The International Students and Scholars Office (ISSO, B50 Caldwell Hall, 255-5243) provides a broad range of services to international students. All international students should maintain contact with the ISSO. Counselors in ASCD are also available for assistance.

International students in the College of Human Ecology are encouraged to meet with the college registrar to discuss any questions or concerns that they have about their academic record.

Career Planning, Graduate and Professional School, and Job Search Services

Counseling. The Office of Student and Career Development (172 MVR, 255-2532) provides career counseling and resources to help students explore career options through employment and internship opportunities and professional and graduate school advising. Individual assistance is available as well as group programming, workshops, and panels. Career development is strongly encouraged and supported, including skill development in résumé writing, networking, and interviewing. Students also are instructed in the use and protocol of online résumé submissions and on-campus recruiting. The office works in conjunction with Cornell Career Services (103

Barnes Hall, 255-5221) to facilitate access to university-wide programs.

The Career Development Center (CDC, 162 MVR) is a starting point for students looking for career information. Selected resources about career planning and job search techniques, general directories to begin job or graduate school searches, and information for alumni networking are housed there. Also available are Cornell Career Services handouts and registration forms, graduate and professional school testing booklets and registration packets, study abroad, as well as Urban and Capital Semester program materials. Computers provide access to web-based information regarding internship and employment opportunities, as well as graduate/professional schools.

The CDC is open weekdays during the academic semester. Student career assistants are available to provide résumé and cover letter critiques, conduct mock interviews on video, and help navigate the library resources. Final critiques can be provided by a career counselor once the student review has been completed.

To provide assistance to interested students, former Urban Semester Program participants comprise a portion of the CDC student staff and are available daily to answer questions about the program and its application process.

Selected services are listed below. Exploring such services will help students investigate their interests, skills, and values as they relate to career options, provide useful information and tips for a successful summer or full-time job search, and provide access to employment opportunities. In addition, please refer to the college's career development web site: www.human.cornell.edu/che/Academics/Career-Services/index.cfm.

Pre-law or Pre-med. Students who consider themselves pre-law or pre-med are encouraged to join a student group affiliated with ASCD. Those interested in pursuing a legal education can join PLUS (PreLaw Undergraduate Society), which provides information on applying to law school, preparing for the LSAT, and examining career opportunities in law. Students interested in pursuing a health-related career are welcome to join PATCH (Pre-professional Association Toward Careers in Health), which provides opportunities for students to explore various careers in medicine and health care. PATCH provides guidance as students prepare for the MCAT and other standardized tests, and it offers and mentor program for incoming students.

Extern Program. Students can spend one day to one week over winter break shadowing an alum in a career field of their choice. They observe day-to-day activities, discuss specific jobs and careers, and sometimes obtain limited hands-on experience. This service is available to sophomores, juniors, and seniors and is a valuable networking tool.

Fresh Program. This service is similar to the Extern Program but is available to freshmen only. Students can spend one day to one week over spring break shadowing an alum in a career field of their choice. In addition to career explorations, the Fresh Program provides excellent networking opportunities.

Internship and Employer Files. The CDC keeps files of more than 100 internships and hundreds of potential employers for student review.

Alumni Career Presentations. Alumni from the college come back to campus throughout the year to discuss their postgraduate or professional experiences. These meetings are ideal for exploring career outcomes of specific majors.

AlumNet. Students have access to Human Ecology alumni who can provide information on their careers and offer suggestions on a job search in their particular field or location. Students can query alumni on a host of variables and review selected alumni résumés to learn more about specific careers. AlumNet is also an excellent networking tool.

Job Search Workshops. The college hosts several workshops every semester. These workshops are designed to help students market themselves for either summer or full-time job opportunities. Students learn how to conduct effective job searches, write résumés and cover letters, and interview successfully.

CornellCareerNet. Exclusively for Cornell students, CornellCareerNet provides access to many important services offered by Cornell Career Services. These services include a listing of job opportunities, summer opportunities, alumni networking databases, access to on-campus recruiting, employer showcases, and more.

CornellCareerNet On-Campus Recruiting (OCR) This service provides access to on-campus interviews with employers interested specifically in Cornell students. Interviews occur primarily in banking and financial services, retail sales and management, facilities planning and management, and consulting. Please note that on-campus recruiting is only one component of a successful job search. Approximately 70 percent of Cornellians get their jobs through other resources.

New York Recruiting Consortium. Available exclusively to Human Ecology and Arts and Sciences students, the New York Recruiting Consortium is held in New York City over winter break. It offers interviews for full-time employment with employers involved in banking and financial services, retail sales/management, advertising, law, health care, and consulting.

NFP in New York City and NFP in Washington, D.C. Speak with representatives from dozens of New York City or Washington, D.C., not-for-profit/public service agencies about work or internship opportunities in health, education, advocacy, government, and more (held only during the spring semester).

Communications Consortium. Interview with organizations in advertising, public relations, film and radio, and print media. National organizations come to Syracuse, N.Y., to meet with students for individual appointments. During the spring semester, a job fair is held the evening before.

GRADUATION REQUIREMENTS AND POLICIES

It is important for students to track their graduation progress by comparing their current transcript with an appropriate curriculum sheet. Official transcripts may be obtained at the Office of the University Registrar (B07 Day Hall). Curriculum sheets are available in the Human Ecology registrar's

office (146 MVR). Students are responsible for planning course selections to ensure that graduation requirements are fulfilled in eight semesters. Transfer students are allowed fewer semesters based on the number of transferable credits granted at admission. Students requiring additional semesters to fulfill their graduation requirements must meet with a Human Ecology counselor (172 MVR) and request to petition for an extension.

Grade Point Average (GPA) Requirement for Graduation

- Students must earn a minimum cumulative GPA of 2.0 (C) or better to graduate.

Cornell Credit Requirements

- To graduate, a student must earn a minimum of 120 academic credits. Physical education credits and "00" courses do not count toward the 120 required credits.
- Of the 120 credits required to graduate, at least 60 credits must be earned at Cornell University (applicable to transfer students).
- As of fall 2003, students who matriculate as freshmen may apply a maximum of 15 non-Cornell credits earned before matriculation (including AP, IB, and college credits) toward the 120 credits required for graduation. For all students, an additional pre-approved 15 in absentia credits earned after matriculation may be applied. AP, IB, and transfer courses may be applied toward fulfillment of specific requirements regardless of whether the credit is transferred (i.e., required courses may be waived). Refer to "Advanced Placement Credit" for full details.
- No *college* credit earned before matriculation and used to meet Cornell's minimum admission requirements may be counted in the 120 credits required for graduation. This policy does not apply to transfer students.
- *Courses taught by a college in the high school setting or counted toward high school graduation are not allowed to count for either credits or fulfillment of requirements (i.e., Syracuse Project Advance).*
- Cornell extramural credit (defined below) is limited to 15 credits toward the 120 required.
- Strict limitations exist on the number of credits that can be applied toward the 120-credit minimum for special studies courses (4000, 4010, 4020), for 4030 courses, and for courses taken with an optional S-U grade. Details follow.

Human Ecology Credit Requirements

- The college divides the 120 minimum required academic credits into four general categories. (*Students should refer to curriculum sheets for their major for specific details on course selections. These sheets are available in the Office of the Registrar (146 MVR) and in the Office of Admission, Student, and Career Development (172 MVR) as well as on the college web site at www.human.cornell.edu.*)

- a. Category I—College distribution requirements
 - Natural sciences
 - Social sciences
 - First-year writing seminars
 - Humanities
 - Quantitative and analytical courses (math and statistics)
- b. Category II—Requirements for a major
- c. Category III—Elective credits
- d. Category IV—Physical education

These categories are detailed below.

- **Students must complete 43 Human Ecology (HE) credits from Categories I, II, and III.** *Additional course-specific rules are listed below.*

S–U grading rules for this requirement are as follows:

1. If a course is a requirement in Category I or II, the course may *not* be taken for an S–U grade (unless it is the only grade option offered for the course).
2. Courses used to count toward Category III (electives) that are taken for an S–U grade *may* also count toward the 43-credit requirement.
3. Students should refer to the section on S–U grading rules for full S–U grading details.

- **Students must complete 9 Human Ecology (HE) credits from outside their major department from Categories I, II, or III.** Note: Biology and society majors are exempt from this requirement. A maximum of 3 credits from the 4000–4020 special studies series may be applied to this requirement. *Other course-specific rules for this requirement are listed below.*

S–U grading rules for this requirement are as follows:

1. If a course counting toward the 9-credit outside-the-major requirement is also a requirement in Category I or II, the course may *not* be taken for an S–U grade unless it is the only grade option offered for the course.
2. Courses used to count toward Category III (electives) that are taken for an S–U grade may also count toward the 9-credit outside-the-major requirement.
3. Students should refer to the section on S–U grading rules for full S–U grading details.

Course-specific rules that apply to both the 43 Human Ecology credit requirement and the 9 Human Ecology credit outside-the-major requirement:

1. Effective fall 2004, Human Ecology (prefix “HE”) courses below the 3000 level (e.g., HE 1100 and 1200) do not count toward either the 43-credit requirement or the 9-credit outside-the-major requirement. These HE–prefix courses that are below 3000 level may be used as elective credit.
2. ECON 1110 and 1120 are considered Human Ecology credit courses and may be used to fulfill Human Ecology’s 43- and 9-credit outside-the-major requirements. If either or both courses are

taken to fulfill a Category I or II requirement, they must be taken for a letter grade.

3. BSOC courses do not count as Human Ecology credit.
- 4., Experiential credit is applied to Human Ecology’s 40- and 9-credit outside-the-major requirements as follows:
 - a. Urban Semester (HE 4700, 4800, 4900/4950). Effective fall 2005, students in all Human Ecology majors earn:
 - 15 Human Ecology credits and 8 credits toward the 9-credit outside-the-major requirement.
 - b. Capital Semester (HE 3920). Effective spring 2007, all students earn:
 - 15 Human Ecology credits and 8 credits toward the 9-credit outside-the-major requirement.
 - c. Cornell in Washington (PAM 4060). For this entire semester, PAM majors earn:
 - 8 credits toward the 43-credit requirement, which also count as 8 PAM credits.
 Non–PAM majors earn:
 - 8 credits toward the 43-credit requirement, which also count as 8 credits toward the 9-credit outside-the-major requirement. The remainder of the credits counts as elective credit.

Elective Credits

Students have individual objectives in choosing courses beyond the minimum requirements of the major. The university is diverse; the departments, centers, and special programs numerous; the fields of study almost unlimited. Counselors and faculty advisors are available to discuss which courses may interest students and best round out their education.

Students should consult the index in this catalog to learn where different subjects are taught in the university. Some subjects are taught in more than one division.

Elective credits can be earned in the endowed and statutory colleges of Cornell.

An unlimited number of credits may be taken in the statutory colleges of Cornell.

Physical Education Requirements for Graduation

1. Students must earn 2 credits of physical education within their first two semesters. These 2 credits do not count as part of the 60 Cornell credits, or as part of the 120 total credits required for a degree, or toward full-time status. Students who matriculate at Cornell with 12 or more credits must complete only 1 credit of physical education. Students who transfer more than 25 credits (excluding AP credits) are not required to take physical education at Cornell, regardless of whether they took physical education at their previous college.
2. Students must pass the university’s swim test. Students who transfer more than 25 credits (excluding AP credits) are exempt. Refer to “University Requirements for Graduation—Physical Education—Swim Test” in this catalog for specifics.

Minimum Semester Requirements

1. Students enrolling in the college as freshmen must complete at least 12 credits of Human Ecology courses by the end of the fourth semester, and at least 5 credits of Human Ecology courses must be taken in the freshman and 7 credits in the sophomore years (ECON 1110 and 1120 may be used to fulfill this requirement).
2. Students must carry 12 credits each semester, excluding physical education, to be matriculated as full-time students. Mature students must carry a minimum of 6 credits each semester (see “Mature Student Guidelines” for details).
3. In special cases, a student may petition to carry between 8 and 12 credits. Forms for petitioning this exception and advice on how to proceed are available in the Office of Admission, Student, and Career Development (172 MVR).

Special Studies

- Students may use only 12 credits of 4000, 4010, 4020, or 4030 courses toward graduation.
- Additional credits of 4000, 4010, 4020, or 4030 courses can be taken but will not be applied toward graduation.

“00” Courses

- “00” courses do not count toward graduation requirements but do count toward full-time semester status.

Requirements for Majors

- Students must fulfill the requirements specified for a major that are in effect at the time of their matriculation or thereafter. The requirements are detailed in curriculum sheets that are maintained for each academic year.

S–U Grade Options

- The S–U grading option may *not* be used for courses in category I or required courses in category II unless it is the only grade option offered for those courses. S–U grades *may* be used for the 9 credits of Human Ecology course work outside of one’s major and for electives in category III.
- Students may apply no more than 12 credits of S–U toward the 120 credits required for graduation. If a required course is offered only S–U, it will not count toward this limit. Also, Honors Research 4990 taken S–U does not count against the 12 maximum limit. Students may take more S–Us if they choose, but the additional credit may not be applied toward graduation.

First-Year Writing Seminars

In each of their first two semesters of matriculation at the College of Human Ecology, students are required to take a Knight Program First-Year Writing Seminar. This policy also applies to transfer students. One or more of the seminars may be waived for transfer students if the college registrar grants credit for equivalent course work taken before matriculation at Cornell.

Those who do not fulfill this requirement on time will be referred to the Committee on Academic Status. Refer to "Criteria for Good Standing" for specifics on warning statuses that the committee applies to students who do not complete this requirement.

First-year writing seminars must be taken at Cornell and **may not be taken in absentia**. Students who receive a score of 5 on either the English Literature and Composition or English Language and Composition Advanced Placement (AP) exams can be exempt from *one semester* of their first-year writing seminar requirements. No other AP scores will allow a student this exemption (even if a lower score allows the student to use the course as elective credit toward graduation.) Students should be aware that the add/drop period for first-year writing seminars may be shorter in duration than the add/drop period for most Cornell classes.

Wells, Ithaca College, and Study Abroad Credits

Any credits earned with the Wells or Ithaca College exchange program are considered Cornell credits for the purpose of fulfilling the 60 Cornell credit graduation requirement. They may not be used for Human Ecology credit. Study abroad courses may also count as Cornell credit (but not for Human Ecology credit). Refer to "Cornell Credit Requirements" for details on how many advanced placement (AP) credits can be applied toward the 120 credits needed for graduation.

Advanced Placement Credit

Students can earn advanced placement credit from one of the following:

1. The requisite score on a departmental examination at Cornell (usually given during orientation week) or on a College Entrance Examination Board (CEEB) achievement test. The requisite scores for the CEEB exams are determined by the relevant department at Cornell, vary by subject, and are listed in the beginning of this catalog. College-specific rules apply toward many AP courses such as biology, English literature, English composition, and statistics.
2. A regular course taught at an accredited college to college students and approved by the relevant department at Cornell. Some departments have delegated the review of courses to college staff according to guidelines they have formulated. Some departments review each request individually. Some departments accept credit from virtually all accredited colleges; some do not.
3. Credit from the International Baccalaureates (IB) is evaluated individually.
4. Refer to "Cornell Credit Requirements" for details on how many Advanced Placement (AP) credits can be applied toward the 120 credits needed for graduation.

Note: Cornell does not accept credit for courses sponsored by colleges but taught in high schools to high school students, at colleges if enrollment is targeted at high school students, or if the course was used toward high school credit. This is true even if the college provides a transcript of such work. These courses also may not be used to fulfill college requirements.

Students who have taken such courses may, however, take the appropriate CEEB test to qualify for credit as in paragraph 1 above. For further information and limitations on Advanced Placement credit, see the front pages of this catalog.

Foreign Language Study and Placement

Students who studied a foreign language before coming to Cornell and who want to continue must take either the CEEB test in that language or a Cornell departmental language placement test. The latter is given during orientation week in September and again in December, January, and May. Human Ecology students who plan to work with non-English-speaking people in this country or abroad often find it necessary to be proficient in another language. Many study abroad programs in non-English-speaking countries require the equivalent of two years of college-level language study.

Extramural Credit

Extramural credit is administered by the Office of Continuing Education and Summer Sessions (B20 Day Hall, 255-4987). Extramural credit is charged by the credit hour at the endowed tuition rate. Students may count only 15 credits of extramural credit toward their degree requirements. A student may enroll for extramural credit during the fall or spring semester only if he or she is not registered in the College of Human Ecology. For example, some students enroll for extramural credit before matriculating at Cornell.

An exception to this rule is credit earned in the Ithaca College or Wells College exchange programs. Students enrolled in these programs simultaneously maintain their status as students registered in the College of Human Ecology.

Humanities

Only certain classes will count for Category I, Humanities. To determine eligibility the college uses the following definition: "The humanities include the study of literature, history (including art and design history), philosophy, religion, and archaeology. Critical, historical, and theoretical studies of the arts and design are considered humanities. Languages and creative or performing arts such as the writing of fiction or poetry, painting, sculpting, designing, composing or performing music, acting, directing, and dance are not considered humanities." Additionally, social science courses such as sociology, government, anthropology, and psychology are not considered humanities.

Specifically, courses in the following list will count as humanities:

Africana Studies (literature and history)

Archaeology

Asian American Studies

Asian and Near Eastern Studies (literature and history)

Classics (literature and history)

Comparative Literature

Development Sociology 1750, 3180

English (literature only)

Fiber Science & Apparel Design 1250

History

History of Art/History of Architecture

Landscape Architecture 2820

Music and Theatre Arts (theory, literature, and history only)

Natural Resources 3320

Philosophy

Policy Analysis and Management 5310, 5340, 5520

Religious Studies

Science and Technology Studies 2050, 2060, 2330, 2500, 2810, 2820, 2860, 2920, 3580, 3600, 3890, 4330, 4440, 4470, 4720, 4810, 4900

Math Requirement

Students may meet the college level requirement in *one* of the following ways.

Any CORNELL math course except MATH 1000 (BTRY 1150 may be used)

OR

Any CORNELL statistics course

OR

Score of at 3 or higher on the AP Calculus BC exam. (Other AP math credit could be used toward graduation credit but not used to meet the math requirement)

Notes:

- Departments may impose additional requirements for majors or specify courses within this requirement.
- Students entering as transfers may apply to have their stats or math courses approved, but pre-calculus courses would not longer meet this requirement or receive graduation credit.

PROCEDURES

Registration and Course Enrollment

Registration Requirements

University registration is the official recognition of a student's relationship with the university and is the basic authorization for a student's access to services and education. Completion of registration is essential to enable the university to plan for and provide services and education, guided by the highest standards for efficiency and safety. Unauthorized, unregistered persons who use university services and attend classes have the potential to use university resources inappropriately and to displace properly registered students. In addition, the university assumes certain legal responsibilities for persons who participate as students in the university environment. For example, policy states that New York State health requirements must be satisfied. Because these requirements are intended to safeguard the public health of students, the university has a responsibility to enforce the state regulations through registration procedures.

The policy on university registration is intended to describe clearly the meaning of and the procedures for registration so that students can complete the process efficiently and be assured of official recognition as registered students. With the clear

communication of the steps for registration, it is hoped that compliance will occur with a minimum of difficulty.

To become a registered student at Cornell University, a person must complete course enrollment according to individual college requirements; settle all financial accounts including current semester tuition; satisfy New York State health requirements; and have no holds from the college, the Office of the Judicial Administrator, Gannett Health Center, or the Bursar's office.

Individuals must become registered students by the end of the third week of the semester. Cornell University does not allow persons who are not registered with the university in a timely manner to attend classes. The university reserves the right to require unauthorized, unregistered persons who attend classes or in other ways seek to exercise student privileges to leave the university premises.

Verification of Registration

Many insurance companies or scholarship funds require verification of full-time registration at Cornell. Should students need such verification, they should use the official university verification service at <http://certification.cornell.edu> or request an official letter from the Office of the University Registrar (B-7 Day Hall). Students who need letters of good standing should contact the Human Ecology registrar's office (146 MVR).

Bursar Bill

A bursar bill is sent to each student over the summer and winter breaks; it summarizes what is owed to the university. The bursar bill can also be viewed through *Student Center*. Any questions regarding the bursar bill can be directed to the bursar's office (260 Day Hall, 255-2336). Initial New York State residency eligibility is determined during the admissions process, but the bursar's office will handle any request for a status change after matriculation.

Late University Registration

A student clearing his or her financial obligations after the deadline date on the bursar's bill is considered late. **Late registrants are assessed a finance charge on the bursar's bill starting from the date the bill is due.** According to university policy, all students must be registered before the end of the third week of classes. If for any reason a student registers after that time, the Bursar's office will charge a late fee. **Students who fail to register by the third week of the semester may be withdrawn from the university. Human Ecology students who do not arrange payment agreements satisfactory to the university bursar by the last day of classes for a semester will be withdrawn from the university. Furthermore, credit for any classes attended for the semester will not be awarded regardless of the letter grade received for a class. Should withdrawn students wish to return, they must reapply through the college admissions office.**

Proration of Tuition

Except for mature students, it is seldom possible to have tuition prorated if a student carries fewer than 12 credits during a semester. See the college registrar (146 MVR) for more information. Students of mature status may carry 6 to 11 credits but must

request that their tuition be prorated. Prorated tuition will be considered only for requests of between 3 and 10 credits. All requests should be made to the college registrar (146 MVR) by the end of the pre-enrollment period in the semester before the term in which proration is requested.

Course Enrollment

Initiating the Process

"CoursEnroll" selections are only "requests" for seats in classes. Between the end of the course enrollment period and the beginning of the next semester, course requests are evaluated by the offering college department. Students can determine if their requests have been successful when final schedules are published before the add/drop period. Students are expected to make course requests for the subsequent semester during a specified time in the current semester. Those dates are advertised publicly and are available on the university registrar's web site (<http://registrar.sas.cornell.edu>). "CoursEnroll" takes place electronically, using software available through *Student Center*. During this time, each student must meet with his or her faculty advisor to discuss academic plans.

Information on courses is readily available in this catalog and in the *Course and Time Roster* for each semester. Both of these publications can be accessed on the web through CUInfo.

Incoming students will receive tentative schedules upon their arrival to campus, and will meet with faculty advisors during the orientation period.

Course Loads

Full-time matriculated students must carry at least 12 credits (exclusive of physical education courses) to maintain full-time status. Refer to the preceding section, "Minimum Semester Requirements," for details. The normal course load in the college ranges from 12 to 18 credits, although there is no limit to the number of statutory credits a student may take each semester. Nonetheless, students should avoid planning excessive workloads; the time required to keep abreast of courses tends to increase as the semester progresses. Students may not withdraw from courses after the seventh week of classes without petitioning and by substantiating extenuating circumstances. Students should avoid the need to drop courses by taking on a reasonable workload and using the drop period to make changes in their program.

Late Course Enrollment

Students who do not complete course enrollment during the CoursEnroll period usually must wait until the beginning of the next semester's add/drop period to enroll. Extensions are rarely granted and usually only for documented illness.

Students who do not meet the deadline for any reason should see the college registrar in 146 MVR as soon as possible. The college registrar can explain available options and course enrollment procedures under such circumstances.

Note: Students can review their course schedule via computer using *Student Center*. Students are responsible for checking their course schedule for accuracy of course numbers, credit hours, grade options, and

other data. Errors must be corrected immediately. Procedures for correcting enrollment errors as well as for making any other changes are described in the following section.

Course Enrollment Changes

It is to the student's advantage to make any necessary course enrollment changes as early in the semester as possible. Adding new courses early makes it easier for the student to keep up with course work. Dropping a course early makes room for other students who may need it for their academic programs.

Ideally, students evaluate their course load carefully at the beginning of the semester. If, in the first week or two, the instructors do not discuss the amount of material to be covered and the extent of student assignments, students need to ask about course requirements.

Deadlines for Add/Drop and Grade Option Changes

Note: Brief add/drop periods exist for first-year writing seminars and half-semester courses.

1. During the first three weeks of the semester, courses may be added, dropped, or the grade option changed. Special status courses (4000, 4010, 4020) may be added through the seventh week of classes. 4030 Teaching Apprentice courses must be added during the first three weeks of the semester.
2. From the fourth through the seventh week of the semester, courses may be dropped. **Grade option changes may not be made at this point regardless of instructor's permission.**
3. After the seventh week of the semester, any requests for course changes must be made through the petition process. Students should request an appointment with an Admission, Career and Student Development counselor in 172 MVR to initiate the process.
4. After the seventh week of the semester, any student granted permission to drop a course after petitioning will automatically receive a grade of W (Withdrawn), and the course and grade will remain on the official transcript even if repeated in a later semester. The deadline to petition to drop a course with a "W" is the end of the 12th week.

Deadlines for Half-Semester Courses

Students may drop half-semester courses within the first three-and-one-half weeks of the course. Students may add a course after the first week of classes only with the permission of the instructor. After the first three-and-one-half weeks, students must petition to drop the course.

Time and Place for Add/Drop and Grade Option Changes

All students may adjust their schedules and grading options during the first three weeks of each semester. **To make course changes after the seventh week of the semester, a student must file a general petition form** (see "Petition Process.") Students are expected to attend classes and to do assigned work

until the petition has been formally approved or denied.

Permission of Instructor

Certain courses may be taken only with the permission of the instructor as indicated in this catalog or on the official course description on the web. Undergraduates must obtain permission of the instructor to take any graduate course. Students must request the instructor's permission during the course enrollment period by placing their name on a list maintained by the departmental advising assistant.

Students interested in taking a course in the Department of Art in the College of Architecture, Art, and Planning are required to register with the departmental secretary (100 Olive Tjaden Hall) before enrolling in the course. Seniors who want to take an elective course in the Johnson Graduate School of Management are required to obtain permission of the instructor on a course authorization form that the student then files with that school's registrar in Sage Hall.

Course Enrollment while Studying Abroad

Students who plan to study abroad have several options available to enroll for their returning semester at Cornell. Students can consult with their faculty advisor before departure to consider the schedule of classes that they will take upon their return to campus. Once abroad, the student can use the web to access *Courses of Study* and the *Course and Time Roster* for the coming semester. The roster is available on the web in approximately the first week of October and the first week of March. Using these resources, the student can e-mail the course requests to the student's faculty advisor for approval; the faculty advisor can then e-mail them to the college registrar. A student who does not have access to the Internet while abroad can wait for the *Course and Time Roster* to arrive via airmail from the Cornell Abroad office. The student can then e-mail, fax, or mail the course requests to their faculty advisor and ask the faculty advisor to submit the course requests to the college registrar. The *Course and Time Roster* becomes available only the day that pre-enrollment begins; thus, students who depend on receiving the mailed copy will experience some delay in submitting their course requests. Requests must be submitted within the published deadlines.

Oversubscribed Courses

Enrollment in many human ecology courses is limited. When a course is overenrolled, students are generally assigned on the basis of seniority or by criteria defined for each course as listed in this book. Students' professional goals may be considered. Those students not admitted to a course may be placed on a waiting list maintained by the professor or the department offering the course. Course instructors are responsible for determining the criteria to fill their classes from waiting lists. Waiting lists are maintained only for the first three weeks of each semester.

Limited-Enrollment Classes

Students who do not attend the first two class sessions of courses with limited enrollment may be dropped from the course list. Students can avoid being dropped from a class by notifying the instructor that unavoidable circumstances have prevented their attendance.

Cross-Listed Courses

To apply a cross-listed course to graduation requirements, students must enroll in the department for which they need the credits. If changes in department designations need to be made, this must be done during the official course add period for the semester. To do so, students must complete a special form, which can be obtained in the registrar's office in 146 MVR.

Courses with Duplicate Content

Students should scrutinize course descriptions for details about other Cornell courses with duplicate content that would preclude a student from receiving full credit for duplicate courses. For example, students may not receive 6 credits toward graduation requirements if they take DSOC 1010 and SOC 1101. Because both are introduction to sociology courses, only 3 credits would be allowed. To aid students in this evaluation, the college maintains a partial list (those that are commonly required in Human Ecology curricula) of Cornell courses that have duplicate content.

Special Studies Courses

Each department in the College of Human Ecology (DEA, FSAD, HD, NS, and PAM) offers special studies courses that provide opportunities for students to do independent work not available in regular courses. One of those courses, designated 3000 Special Studies for Undergraduates, is intended primarily for students who have transferred from another institution and need to make up certain course work.

The other special studies courses are 4000 Directed Readings; 4010 Empirical Research; and 4020 Supervised Fieldwork. Juniors and seniors normally take those courses, and a faculty member in the department in which the course is offered supervises work on an individual basis. It is important for students to use the appropriate course number (3000, 4000, 4010, or 4020) for a special project.

To register for a special studies course, a student obtains a special studies form from the departmental office where he or she plans to take the course. The student discusses the proposed course with the faculty member under whose supervision the study would be done and then prepares a plan of work. If the faculty member agrees to supervise the study, the student completes a special studies form and obtains signatures from the instructor, faculty advisor, and department chair before submitting the form to the college registrar's office (146 MVR). Special studies forms are available in 146 MVR or in departmental offices.

Semester credits for special studies courses are determined by the number of contact hours the student has with the supervising faculty member (or a person designated by the faculty member). To earn 1 credit, a student must have the equivalent of three to four hours of contact time per week for 15 weeks (a total of 45 contact hours). For additional credit, multiply the number of credits to be earned by 45 to determine the number of contact hours needed for the course. **Strict limitations exist on the number of special studies credits that can apply toward graduation and how these credits may be applied toward Category II requirements in the major. Refer to "Human Ecology**

Credit Requirements" for details. To register in a special studies course taught in a department outside the college, follow the procedures established by that department.

Changes in Status

General Petition Process

The petition process permits students to request exceptions to existing regulations. Petitions are considered individually, weighing the unique situation of the petitioning student with the intent of college and university regulations. In most cases, extenuating circumstances are needed for a petition to be approved if it involves waiving a deadline. These are situations beyond a student's control, such as a documented medical emergency.

Students can avoid the necessity to petition by carefully observing the deadlines that affect their academic program. See "Course Enrollment Changes" above for some of the important deadlines. If unsure of a deadline, check with a counselor in the Office of Student and Career Development (172 MVR) or with the staff in the college registrar's office (146 MVR).

A general petition may be needed to carry fewer than 12 credits, withdraw from a class after the seventh-week deadline, add a course after the third-week deadline, change a grade option after the third-week deadline, be exempt from one or more of the college's graduation requirements, substitute a required course in one's major with another course, or stay an additional semester to complete the graduation requirements.

Although many kinds of requests can be petitioned in the college, options other than petitioning may be preferable in some cases. To explore whether a petition is appropriate, the student may discuss the situation with a college counselor or the college registrar.

If a student decides to submit a general petition, the form is available in the registrar's office (146 MVR) and in the Office of Student and Career Development (172 MVR) or on the web at www.human.cornell.edu/che/Academics/Undergraduate/Student_Services/Registrar/Forms-and-Petitions.cfm. After completing the form and obtaining the required signatures, the student must turn the form in to the registrar. Once a decision is made, a letter is placed in the student's college mail folder indicating approval or denial of the petition.

Students may appeal the college registrar's decision to the Committee on Academic Status. Students who elect to appeal have the option of appearing in person before the committee to state their case. A member of the counseling staff can guide a student through this process.

In Absentia Study

Under certain conditions, credit toward a Cornell degree may be given for in absentia study, that is, study done at an accredited institution away from Cornell after the student matriculates in the College of Human Ecology. In absentia study can be done during any semester: fall, winter, spring, or summer. First-year writing seminars may not be taken in absentia.

To be eligible for in absentia study, a student must be in good academic standing and must

receive permission in advance from the college registrar. A student not in good standing may study in absentia but will not receive transcript credit until the Committee on Academic Status has returned the student to good standing. Students not in good academic standing who wish to finish their degree in absentia must seek pre-approval from the college's Committee on Academic Status via the general petition process. In some cases, students may petition for in absentia credit after the work has been completed, but there is no guarantee that such credit will be awarded without advance approval.

In absentia petition forms are available in the Human Ecology registrar's office (146 MVR) or on the web at http://www.human.cornell.edu/che/Academics/Undergraduate/Student_Services/Registrar/Forms-and-Petitions.cfm. The student submits the form to the Human Ecology registrar's office (146 MVR). In absentia study during the fall or spring semester carries a nominal administrative fee. (Contact the Bursar's office, 260 Day Hall, for the current amount.) Students will receive a letter in their college mail folder from the college registrar notifying them of the petition decision.

Note: Students seeking pre-approval for in absentia course work should do so well in advance as turnaround time for the approval process can be variable.

A student may take up to 15 credits in absentia as long as the courses do not duplicate courses already taken and the in absentia courses are applicable to the requirements of the college. Students who study abroad during the summer or winter term are limited to a maximum of 9 in absentia credits. Study abroad during the fall or spring semester must be done through the Study Abroad office and is not considered in absentia study. **Students studying while on a leave of absence during the spring or fall semesters may not receive credit for nondomestic campus programs.**

On the following rare occasions a student's petition for more than 15 credits in absentia may be allowed: (1) the work taken represents a special educational opportunity not available at Cornell, (2) it relates to the student's particular professional goals, and (3) those goals are consistent with the focus of the college. The in absentia petition form is used to request more than 15 credits in absentia. Wells and Ithaca College credit are not considered in absentia credit and are not included in the 15-credit limit.

The college registrar requests approval from the appropriate department if a student wants to apply in absentia credit to requirements in his or her major. Students seeking in absentia credit for a modern foreign language in which they have done work must obtain the approval of the appropriate language department (College of Arts and Sciences). The department will recommend the number of credits the student should receive and may require the student to take a placement test after returning to Cornell.

The student is responsible for having the registrar of the institution where in absentia study is done send transcripts of grades directly to the Human Ecology registrar's office (146 MVR). Only then will credit be officially assessed and applied to the Cornell

degree. Credit for in absentia study will be granted *only* for those courses with grades of C- or better. Courses may not be taken for S-U grades unless it is the only grade option offered. In absentia courses appear on the Cornell University transcript, but the grades are not calculated in the student's GPA.

A student who holds a Regents' or Children of Deceased or Disabled Veterans Scholarship may claim that scholarship for study in absentia if the study is done in a college in New York State and if it is for a maximum of 15 credits acceptable to the College of Human Ecology.

The rules regarding study in absentia apply to transfer students with the additional stipulation that at least 60 credits must be taken at Cornell. At least 43 of the 60 credits must be in the College of Human Ecology at Cornell unless the student has transferred equivalent human ecology credit. (No more than 20 credits of equivalent credit may be applied to the 43 credits required in human ecology course work.)

Leaves of Absence

A student may request a leave of absence before the beginning of the semester or during the first seven weeks of the semester for which a leave is sought. A leave may be extended for a second semester by making a written request to the Office of Student and Career Development (172 MVR). Note: In absentia study status and leave of absence status are not the same; however, students may petition to earn credits with either status. Students on leave must notify the college registrar (146 MVR), in writing, of their intention to return to campus at least one month before the beginning of the semester.

Those whose leave period has expired will be withdrawn from the college after the third week of the semester they were due back.

Students considering a leave of absence should discuss their plans with a counselor in the Office of Admission, Student, and Career Development. The counselor can supply the necessary forms for the student to complete and file with the Human Ecology registrar's office (146 MVR). Leaves initiated after instruction begins will be charged a percentage of the semester tuition. (Refer to "Bursar Information" in this catalog for a billing schedule.)

Requests for a leave of absence received after the first seven weeks of the semester, or requests for a leave of absence from students who have already had two semesters' leave of absence, will be referred for action to the Committee on Academic Status. The committee may grant or deny such requests, attaching conditions to the leave as it deems necessary. Leaves of absence after the first seven weeks are generally granted only when there are compelling reasons why a student is unable to complete the semester, such as extended illness.

A student who requests a leave of absence after the first seven weeks is advised to attend classes until action is taken on the petition. A student whose petition for a leave of absence is denied may choose to withdraw or to complete the semester. If the petition for leave is approved the student's courses will remain on the transcript with W grades.

The academic records of all students who are granted a leave of absence are subject to

review, and the Committee on Academic Status may request grades and other information from faculty members to determine whether the student should return under warning or severe warning or in good academic standing.

Under certain documented medical circumstances a student may be granted a **health leave of absence**. Health leaves are initiated by the student with Gannett Health Center. If Gannett Health Center recommends a health leave for the student, the college registrar may grant the leave. A health leave is for an indeterminate period of time not to exceed five years. Students who are granted a health leave of absence should maintain contact with a counselor in the Office of Student and Career Development (172 MVR, 255-2532) to arrange their return to campus. The counselor will advise the student on procedures to obtain a recommendation from Gannett Health Center to the college registrar for the student's return. Students should plan sufficiently in advance to assure time for Gannett Health Center and the college registrar to consider their request.

Withdrawal

A withdrawal is a termination of student status at the university. Students may withdraw voluntarily at any time by notifying a counselor in the Office of Admission, Student, and Career Development and filing a written notice of withdrawal in the Human Ecology registrar's office. A student considering such an action is urged to first discuss plans with a counselor in the Office of Admission, Student, and Career Development (172 MVR, 255-2532).

In some instances a student may be given a withdrawal by the college registrar. Students who leave the college without an approved leave of absence, or do not return after the leave has expired, will be given a withdrawal after the seventh week of the semester in which they fail to register.

A student who has withdrawn from the college or who has been given a withdrawal by the college registrar and who wishes to return at a later date must reapply through the Office of Admission for consideration along with all other applicants for admission. If the student was in academic difficulty at the time of the withdrawal, the request for readmission will be referred to the Committee on Academic Status (CAS) for consideration, and that committee may stipulate criteria under which the student may be readmitted to the college.

GRADES AND EXAMINATIONS

Grade Definitions and Equivalents

The official university grading system uses a system of letter grades ranging from A+ to D-, with F denoting failure. An INC grade is given for incomplete work and R is given at the end of the first semester of a two-semester course. If a student is given permission to withdraw from a course after the seventh week of the semester a "W" is automatically assigned. Students can view their grades on *Student Center* after the semester has ended. See "Grading Guidelines" for more information on the official university grading policies.

To compute a semester grade point average (GPA), first add up the products (credit hours X grade quality points) and divide by the total credit hours taken. Grades of INC, R, S, SX, U, UX, and W should not be included in any GPA calculations. A grade of F has no quality points, but the credits are counted, thereby lowering the average. A cumulative GPA is simply the sum of all semester products divided by all credits taken. Refer to "Repeating Courses" for details on how GPA is affected if a student repeats a course. For further help on calculating a GPA ask at the college registrar's office (146 MVR).

These are the quality point equivalents:

A+ = 4.3	C+ = 2.3
A = 4.0	C = 2.0
A- = 3.7	C- = 1.7
B+ = 3.3	D+ = 1.3
B = 3.0	D = 1.0
B- = 2.7	D- = 0.7
	F = 0.0

Repeating Courses

Students are allowed to register a second time for a course they have already passed or in which they received an F. If a student has previously passed a course he or she is taking a second time, the second registration will not count toward the degree requirements, and the grade received will not be included in the cumulative GPA.

If a student enrolls in a course in which he or she previously received an F, the credits from the second registration will count toward the graduation requirements and the grade will be included in the cumulative GPA. The F will also remain on the record and will be included in the GPA.

S-U Grades

Some courses in the college and in other academic units at Cornell are offered on an S-U basis (see course descriptions in this book and on the Cornell web site). Courses listed as SX-UX are available only on an S-U basis and may not be taken for a letter grade. University regulations concerning the S-U system require that a grade of S be given for work equivalent to a C- or better; for work below that level, a U must be given. **No grade point assignment is given to a grade of S, and S or U grades are not included in the computation of semester or cumulative averages.** A course in which a student receives a grade of S is, however, counted for credit. No credit is received for a U. Both the S and U grades appear on a student's record. A student who is attempting to qualify for the semester's Dean's List must take at least 12 credits of course work graded non-S-U. See "Awards and Honors" for more details about the Dean's List.

No more than 12 S-U credits will count toward a student's 120-credit graduation requirement. However, a student may take more than one S-U course in any one semester. **S-U courses may be taken only as electives or in the 9 credits required in the college outside the major** unless the requirements for a specific major indicate otherwise. Freshmen enrolled in ENGL 1370 and 1380 (offered for S-U grades only) are permitted to apply those courses to the first-year writing seminar requirement. If a

required course is offered only S-U, it will not count toward the 12-credit limit.

To take a course for an S-U grade, a student must check the course description to make sure that the course is offered on the S-U basis; then either sign up for S-U credit during course enrollment, or obtain and file an add/drop form in the Human Ecology registrar's office before the end of the third week of the semester. After the third week of the semester, students cannot change grade options.

Grades of Incomplete

A grade of incomplete is given when a student does not complete the work for a course on time but when, in the instructor's judgment, there was a valid reason. A student with such a reason should discuss the matter with the instructor and request a grade of incomplete. Students are at risk of going under the minimum semester requirement if an INC grade in a course puts the total number of credit hours under 12 for the semester. For more information, refer to "Minimum Semester Requirements."

A grade of incomplete may remain on a student's official transcript for a maximum of two semesters and one summer after the grade is given, or until the awarding of a degree, whichever is the shorter period of time. The instructor has the option of setting a shorter time limit for completing the course work.

If the work is completed within the designated time period, the grade of incomplete will be changed to a regular grade on the student's official transcript. **If the work is not completed within the designated time period, the grade of incomplete automatically will be converted to an F.**

When a student wants to receive a grade of incomplete, the student should arrange a conference with the instructor (preferably before classes end and the study period begins) to work out the agreement. A form, called Explanation for Reporting a Final Grade of F or Incomplete, which must be signed by both the instructor and the student, needs to be submitted by the instructor to the Human Ecology registrar's office. This form is submitted with the final grade sheets whenever a grade of incomplete is given. This form is for the student's protection, particularly in the event that a faculty member with whom a course is being completed leaves campus without leaving a record of the work completed in the course. If circumstances prevent a student from being present to consult the instructor, the instructor may, if requested by the student, initiate the process by filling out and signing the form without the student's signature and turning the form in to the Human Ecology registrar's office with the grade sheet. Before a student will be allowed to register for succeeding semesters, he or she must go to the Human Ecology registrar's office to fill out and sign the remainder of the form.

If the work is completed satisfactorily within the required time, the course appears on the student's official transcript with an asterisk adjacent to the final grade received for the semester in which the student was registered for the course. A student who completes the work in the required time and expects to receive a grade must take the responsibility for

checking with the Human Ecology registrar's office (about two weeks after the work has been handed in) to make sure that the grade has been received. Any questions should be discussed with the course instructor.

Grade Disputes

Students who find themselves in disagreement with an instructor over grades have several options:

1. Meet with the instructor and try to resolve the dispute.
2. Meet with the chair of the department in which the instructor has his or her appointment.
3. Meet with the associate dean for undergraduate studies of the college in which the course was taught.
4. Meet with the university ombudsman (118 Stimson Hall, 255-4321).

A student may also seek advice from his or her faculty advisor or with a counselor in the Office of Admission, Student, and Career Development (172 MVR).

Examinations

Both the preliminary and final examination schedules are available on the university registrar's web page at <http://registrar.sas.cornell.edu>.

Final Examinations

The following is quoted from the *Cornell University Faculty Handbook*, 1990, pages 66-67:

"The University Faculty long ago established, and has never reversed, the policy that each course should require a final examination or some equivalent exercise (e.g., a term paper, project report, final critique, oral presentation, or conference) to be conducted or due during the period set aside for final examinations.

"Although not specifically prohibited, it is University policy to discourage more than two examinations for a student in one 24-hour time period and especially on any one day. It is urged that members of the faculty consider student requests for a make-up examination, particularly if their course is the largest of the three involved and thus has the strongest likelihood of offering a makeup for other valid reasons, e.g., illness, death in the family, etc.

Legislation of the University Faculty governing study period and examinations is as follows:

1. No final examinations can be given at a time other than the time appearing on the official examination schedule promulgated by the Registrar's Office without prior written permission of the Dean of the Faculty.
2. No permission will be given, for any reason, to schedule final examinations during the last week of classes or the designated study period preceding final examinations.
3. Permission will be given by the Dean of the Faculty to reschedule examinations during the examination period itself if requested in writing by the faculty member, but only on condition that a comparable examination also be given for those students who wish to take it at the time that the examination was originally scheduled. The faculty member requesting

such a change will be responsible for making appropriate arrangements for rooms or other facilities in which to give the examination. This should be done through the Registrar's Office.

4. No tests are allowed during the last week of scheduled classes unless such tests are part of the regular week-by-week course program and are followed by an examination (or the equivalent) in the final examination period.
5. Papers may be required of students during the study period if announced sufficiently far in advance that the student did not have to spend a significant segment of the study period completing them.
6. Faculty can require students to submit papers during the week preceding the study period.
7. Take-home examinations should be given to classes well before the end of the regular semester and should not be required to be submitted during study period but rather well into the examination period.

Students have a right to examine their corrected exams, papers, and the like, in order to be able to question their grading. They do not, however, have an absolute right to the return thereof. Exams, papers, etc., as well as grading records, should be retained for a reasonable time after the end of the semester preferably until the end of the following semester, to afford students such right of review."

Preliminary Examinations

The following is quoted from the *Cornell University Faculty Handbook* (1990), pages 65–66:

"Preliminary examinations are those given at intermediate times during a course. It is common to have three of these in a semester to encourage review and integration of major segments of the course, to provide students with feedback on how well or poorly they are progressing, and to contribute to the overall basis for a subsequent final grade.

The most convenient times and places for "prelims" are the normal class times and classrooms. But many courses, particularly large ones with multiple sections, choose to examine all the sections together at one time and to design an examination that takes more than one class period to complete. In such cases the only alternative is to hold the prelim in the evening. This practice creates conflicts with other student activities, with evening classes and laboratories, and among the various courses that might choose the same nights.

To eliminate direct conflicts, departments offering large multisection courses with evening prelims send representatives annually to meet with the dean of the University Faculty to lay out the evening prelim schedule a year in advance. Instructors of smaller courses work out their own evening prelim schedules, consulting their students to find a time when all can attend. Room assignments are obtained by the faculty member through the contact person in his or her college or the Central Reservations Coordinator.

The policy governing evening examinations is as follows:

1. Evening examinations may be scheduled only on Tuesday and Thursday evenings and only after 7:30 P.M. without prior permission from the Office of the University Faculty.
 - a. Such prior permission is not, however, required for examinations or makeup examinations involving small numbers of students (generally 30 or fewer) provided that the scheduled time is acceptable to the students involved and that an alternate examination time is provided for those students who have academic, athletic, or employment conflicts at the time scheduled.
2. Permission from the Office of the University Faculty to schedule on evenings other than Tuesdays and Thursdays or at a time before 7:30 P.M. will be granted only on the following conditions:
 - a. Conditions such as the nature of the examination, room availability, large number of conflicts, etc., justify such scheduling.
 - b. An alternate time to take the exam must be provided for those students who have academic, athletic, or employment conflicts at the time scheduled.
3. If there is a conflict between an examination listed on the schedule developed at the annual evening prelim scheduling meeting and an examination not on the schedule, the examination on the schedule shall have a priority, and the course not on the schedule must provide an alternate time to take the examination for those students faced with the conflict.
4. If there is a conflict between examinations, both of which are on the schedule developed at the annual evening prelim scheduling meeting or both of which are not on the schedule, the instructors of the courses involved must consult and agree on how to resolve the conflict. Both instructors must approach this resolution process with a willingness to provide an alternative or earlier examination.
5. Courses using evening examinations are strongly urged to indicate this in the course description listed in *Courses* and must notify students of the dates of such examinations as early as possible in the semester, preferably when the course outline is distributed."

ACADEMIC STANDING

Criteria for Good Standing

The College of Human Ecology has established a set of **minimum academic standards** that all students must meet or exceed each semester. These standards are as follows:

1. A student must maintain a semester and cumulative grade point average of 2.0 or higher.
2. A student must successfully complete at least 12 credits per semester, excluding physical education courses. Mature students must carry at least 6 credits each

semester, also excluding physical education.

3. Students enrolling in the college as freshmen must complete at least 12 credits of Human Ecology courses by the end of the fourth semester such that at least 5 credits must be taken by the end of the second semester (ECON 1110 and 1120 may be used to fulfill this requirement). Transfer students must complete 12 Human Ecology credits by the end of their second semester at Cornell.
4. A student must be making "satisfactory progress" toward a Human Ecology bachelor's degree.
5. All students must complete their requirements for first-year writing seminars (FWS) during their first two semesters at Cornell. Students who do not take a required first-year writing seminar in the first semester that they matriculate at the College of Human Ecology will be placed on a warning status.

Students who have completed the second or subsequent semesters of matriculation at the college who have not taken both of the required writing seminars will be placed on a severe warning with danger of being withdrawn status. In these cases, if the student has not pre-enrolled for an FWS for the upcoming semester, a hold will be placed on the student's semester registration status until he or she is actually enrolled in an FWS. **If this requirement is not completed by the end of that semester, the student will be withdrawn from the college.**

At the end of each semester, the Committee on Academic Status (CAS) reviews each student's academic record to ensure that the **minimum academic standards** listed above are met. The committee then takes appropriate action for students whose academic achievement is considered unsatisfactory as defined by these criteria. CAS considers each case individually before deciding on a course of action. In an effort to support every student's success, the committee may take any of the following actions:

1. Place a hold on a student's university registration status for the current or upcoming semester.
2. Withdraw the student permanently from the college and Cornell University.
3. Require the student to take a leave of absence for one or more semesters.
4. Issue a warning to the student at one of the following levels:
 - a. Severe warning with danger of being withdrawn
 - b. Severe warning
 - c. Warning

These imply that if the student does not show considerable improvement during the semester, the committee may withdraw the student.

5. Add the student's name to a review list; students with this status are monitored by the committee throughout the semester.
6. Return the student to good standing.

Students placed on a required leave must appeal to CAS to return. This appeal occurs at the end of the required leave period. Students

who have been withdrawn may appeal the decision before the committee during the pre-semester appeals meeting. Students who have been placed on a warning status owing to incomplete or missing grades may request that their status be reviewed for possible updating to good standing once the grade records reflect the updates or corrections. These requests should be made using the general petition process and submitted to the college registrar.

All students with an academic warning status automatically will be reviewed for specific criteria at the end of the subsequent semester. In most cases, students put on warning, severe warning, or severe warning with danger of being withdrawn status will be informed of conditions that they are expected to fulfill to return to good standing. In general, these conditions are that a student must earn a minimum semester GPA of 2.0, complete 12 credits (exclusive of physical education), and not have any incomplete, missing, F, or U grades on his or her most recent semester record.

If a student who has been previously placed on a required leave wishes to return to the college, he or she must submit a plan of study to the committee before being rejoined.

Students who have been withdrawn from the college by CAS may request that they be readmitted. Such students have three years from the date they were withdrawn to make this appeal with assistance from a counselor in the Office of Student and Career Development (172 MVR). After three years, a former student must apply for readmission through the college's Office of Admission. A student applying for readmission should discuss his or her situation with a counselor in the Office of Admission, Student and Career Development. The student also should also talk with others who may be able to help—faculty advisors, instructors, or a member of the university medical staff. Any information given to the committee is held in the strictest confidence.

Academic Integrity

Academic integrity is a critical issue for all students and professors in the academic community. The University Code of Academic Integrity states that (1) a student assumes responsibility for the content and integrity of the academic work he or she submits, such as papers, examinations, or reports and (2) a student shall be guilty of violating the code and subject to proceedings under it if he or she:

- Knowingly represents the work of others as his or her own.
- Uses or obtains unauthorized assistance in any academic work.
- Gives fraudulent assistance to another student.
- Fabricates data in support of laboratory or field work.
- Forges a signature to certify completion or approval of a course assignment.
- Uses an assignment for more than one course without the permission of the instructor involved.
- Uses computer hardware and/or software to abuse privacy, ownership, or user rights of others.

- In any manner violates the principle of absolute integrity.

The college's Academic Integrity Hearing Board, which consists of a chairperson, three faculty members, and three students, hears appeals from students who have breached the code. It also deals with cases brought directly to it by members of the faculty.

Academic Records

Students may obtain their Cornell academic record in several ways. The **Cornell transcript**, which is the official record of the courses, credits, and grades that a student has earned can be ordered with no charge at the Office of the University Registrar (B7 Day Hall) or online at <http://transcript.cornell.edu>. For more information, call 255-4232. Students may also access their grades and course schedules electronically using *Student Center*. **Students should be in the habit of checking Student Center by the second week of every semester to confirm that their schedule and grade options are correct.** Adjustments must be made before published enrollment deadlines.

The college also maintains a **graduation progress worksheet** for each student showing progress toward the degree. At the beginning of fall semester continuing students should check their updated worksheet on the registrar tab at www.human.cornell.edu. It is important to check this document and bring any errors to the attention of the staff in the college registrar's office (146 MVR).

Disclaimer: These worksheets are unofficial tally tools used by the college registrar and in no way substitute for a student's responsibility for tracking the progress toward completing degree requirements as outlined in the curriculum sheet for each major.

Access to Records

The Family Educational Rights and Privacy Act of 1974 assures students of privacy of their records. The law also assures students' access to their records. Information concerning a student's relationship with the university is considered restricted and may be released only at the student's specific written request. Restricted information includes the courses elected; grades earned; class rank; academic and disciplinary actions by appropriate faculty, student, or administrative committees; and financial arrangements between the student and the university. Letters of recommendation are restricted information unless the student has specifically waived right of access.

Students who want additional information on access to their records may contact the Office of the College Registrar (146 MVR) or the Office of the University Registrar (B7 Day Hall). An inventory of those student records maintained by Cornell University offices in Ithaca, their location, and cognizant officer are available in the Office of the Dean of Students (401 Willard Straight Hall).

For specific information, refer to the university's policy "Access to Student Information" at www.univco.cornell.edu/policy/ASI.html, or talk with the college registrar.

ACADEMIC HONORS AND AWARDS

The college encourages high academic achievement and recognizes outstanding students in several ways.

Honors

Dean's List. Excellence in academic achievement is recognized each semester by placing on the Dean's List the names of students who have completed satisfactorily at least 12 credits of letter grades and who have a semester GPA of 3.7 or above. No student who has received an F or U in an academic course will be eligible.

Kappa Omicron Nu seeks to promote graduate study and research and to stimulate scholarship and leadership toward the well-being of individuals and families. As a chapter of a national honor society in the New York State College of Human Ecology, it stimulates and encourages scholarly inquiry and action on significant problems of living—at home, in the community, and throughout the world.

Students are eligible for membership if they have attained junior status and have a cumulative average of B or higher. Transfer students are eligible after completing one year in this institution with a B average.

Current members of Kappa Omicron Nu elect new members. No more than 10 percent of the junior class may be elected to membership and no more than 20 percent of the senior class may be elected. Graduate students nominated by faculty members may be elected. The president of Kappa Omicron Nu has the honor of serving as First Degree Marshall for the college during May commencement.

Bachelor of science with honors

recognizes outstanding scholastic achievement in an academic field. Programs leading to a degree with honors are offered to selected students. Information about admission to the programs and their requirements may be obtained from the appropriate department or division. Students in other departments who wish to qualify for honors should contact the Office of Admission, Student, and Career Development (172 MVR) during their sophomore year or the first semester of their junior year. Honors candidates must have a minimum GPA of 3.3 and have demonstrated potential for honors-level research. To graduate with honors a student must take approved courses in research methodology and evaluation, attend honors seminars, complete a written thesis, and successfully defend it in front of a committee.

Bachelor of science with distinction

recognizes outstanding scholastic achievement. Distinction is awarded to students in the top 10 percent of the graduating class based on the last 60 credits earned at Cornell. The graduating class includes students who will complete requirements for bachelor of science degrees in January or May of the same academic year or the prior August. Names of seniors who meet these requirements are presented to the faculty of the college for approval.

The primary objectives of the honor society, **Phi Kappa Phi**, are to promote the pursuit of excellence in higher education and to recognize outstanding achievement by students, faculty, and others through election to membership. Phi Kappa Phi is unique in

that it recognizes scholarship in all academic disciplines. To be eligible for membership students must rank in the top 10 percent of the senior class, or in the top 5 percent of the junior class. Provisions also exist for the election of faculty members and graduate students whose work merits recognition.

Awards

The Elsie Van Buren Rice Public Speaking Contest awards prizes totaling \$2,500 for speeches related to published research by Human Ecology faculty members. The contest is held each year in March.

The Flora Rose Prize is given to a Cornell Human Ecology junior or senior whom, in the words of the donor, "shall demonstrate the greatest promise for contributing to the growth and self-fulfillment of future generations." The recipient receives a cash prize of \$750.

The Florence Halpern Award is named for the noted psychologist, Dr. Florence Halpern, in recognition of her lifelong interest in "innovative human service, which betters the quality of life." In that spirit the award is presented to an undergraduate in the College of Human Ecology who has demonstrated, through supervised fieldwork or community service, creativity in the search for solutions to human problems. The award carries a \$750 cash prize.

COLLEGE COMMITTEES AND ORGANIZATIONS

Student Groups and Organizations

Following are brief descriptions of some of the organizations that offer valuable experiences to human ecology students. Information about many other student activities on campus may be obtained from the Office of the Dean of Students (401 Willard Straight Hall).

The **Cornell Design League** was formed to give students interested in apparel a chance to express their creativity outside of the classroom by producing a fashion show every spring. It has become concerned with all aspects of a professional presentation. Consequently, it also provides a creative outlet for those interested in graphics, photography, illustration, or theater production. Although many of its designers are part of the Department of Fiber Science & Apparel Design, the Design League welcomes people of all majors and schools.

Students have opportunities to work throughout the community in a variety of service capacities. They volunteer in day care centers, youth programs, health-related agencies, services for elderly people and people with disabilities, as well as nutrition programs, arts organizations, and Ithaca schools. For further information, contact the **Public Service Center** (200 Barnes Hall). Call 255-1148 for information about volunteer work or 255-1107 for information about work-study arrangements.

The **Human Ecology Ambassadors** is a group of Human Ecology undergraduates who assist the Office of Admission in the area of new student recruitment and yield. Ambassadors participate in group conferences

with prospective students to provide information from a student's perspective, assist with on-campus programs for high school students and potential transfer students, and help with prospective student phonathons and letter writing. In addition, ambassadors attend regular meetings and serve as coordinators for activities in the Office of Admission.

For information, contact the Office of Student and Career Development (172 MVR, 255-5471).

The **Human Ecology Mature Students Association** is an organization of students who are 24 years of age or older at the time of matriculation. Many mature students need to balance family, work, and other concerns with their academic efforts. The Mature Students Association strives to help by providing a forum for resource exchange and referral, support, socializing, and special projects depending upon expressed interest. These goals are pursued through seminars and informational meetings, the mature students listserv, supplementary orientation activities, liaison with other university offices, and the encouragement of informal networking. For more information, contact Patti Papapietro in the Office of Admission, Student, and Career Development (172 MVR).

Students interested in the relationship between the physical environment and human behavior may join the **Human-Environment Relations Students Association (HERSA)**. For more information, contact the Department of Design and Environmental Analysis.

The **International Facility Managers Association (IFMA)** also has a student chapter. Membership information is available from the Department of Design and Environmental Analysis.

The **Association for Students of Color (ASC)** unites Human Ecology students of color to provide a supportive foundation for their enrollment, retention, graduation, and career placement. ASC members work toward these goals by

1. participating in admissions hosting programs and conducting high school visitations.
2. sponsoring presentations on career and graduate school outcomes of a Human Ecology education.
3. providing volunteer services to the Cornell and Ithaca communities.
4. attending regular meetings and hosting annual fall and spring forums.

For more information, contact Verdene Lee in the Office of Admission, Student, and Career Development (172 MVR, 255-2532).

The **PreLaw Undergraduate Society (PLUS)** is sponsored by Human Ecology and welcomes members from the Cornell community. Meetings provide information and support for students considering careers in law. Programs include information on the law school admission process, law school applications, and LSAT preparations. Additionally, PLUS offers tours of the Cornell Law School and information panels with current law students. Guest speakers include practicing attorneys, law faculty, and current law school students. For more information, contact Deanne Maxwell in the Office of Admission, Student, and Career Development (172 MVR, 255-2532).

The **Preprofessional Association Toward Careers in Health (PATCH)** provides support, advising, and up-to-date information to students pursuing careers in health care. Programs include academic advising, guest speakers from allopathic and alternative medicine, information on medical school admissions, exposure to complementary health care career options, MCAT preparation tips, information on research and internship opportunities, and a visit to a local medical school. This student-run organization is sponsored by Human Ecology and is open to the Cornell community. For more information, contact Paula Jacobs in the Office of Admission, Student, and Career Development (172 MVR, 255-2532).

The **Orientation Committee** consists of students and advisors interested in planning and implementing programs to acquaint new students with the College of Human Ecology. The committee is particularly active at the beginning of each semester and is always eager for new members. For more information, contact Patti Papapietro in the Office of Admission, Student, and Career Development (172 MVR, 255-2532).

Membership in the **Sloan Student Association** is open to students interested in health care and related fields. For more information, contact the president of the association (122 MVR, 255-7772).

The **Students for Gerontology (SFG)** is composed of students from a wide variety of majors who are interested in career and internship opportunities that contribute to the well-being of our aging population. Programs sponsored by this organization focus on developing linkages with community organizations and other student gerontology groups. SFG meets monthly. For more information, contact Nancy Wells, faculty advisor, Bronfenbrenner Life Course Center (E220 MVR, 254-6330).

The **Health and Nutritional Undergraduate Society (Health NUTS)** promotes nutritional well-being through education, communication, and research. Members of the student chapter organize programs such as Food and Nutrition Day in March, and host on-campus speakers in nutrition and health-related fields. The student chapter is open to all students interested in nutrition education. For more information, contact Gail Canterbury (B19 Savage Hall, 255-2628).

Committees and Councils

Several official organizations exist within the college to deal with matters of policy and to provide leadership in college planning. Most include elected student and faculty representatives; the actions of these various groups affect all students directly or indirectly.

The **Educational Policies Committee (EPC)** has two student members, one graduate and one undergraduate, who vote along with the faculty members on all matters relating to college academic policy. Recommendations are submitted to this committee regarding revisions in degree requirements, new curriculum changes, and new course approval.

Students also have the opportunity to serve on the **Admissions Policy Subcommittee**, and the **Academic Integrity Hearing Board**.

The **Selection Committee for the Chancellor's Award for Excellence in**

Teaching or Professional Service handles the nomination and selection process for this prestigious yearly award. The committee consists of three teaching faculty members, one professional staff member, and three undergraduate members.

The **Human Ecology Alumni Association Board of Directors** includes two student board members—one junior and one senior. One student is selected each spring to begin a two-year term as student representative. The two students co-chair the board's Student Activities Committee, which works to increase the visibility of the Alumni Association among the student body by funding a variety of activities. The student members also bring an important perspective to board deliberations about programming and annual goals.

The Committee on Academic Status does not include student representatives but does have a faculty representative from each department. This committee is responsible for upholding the academic standards of the college and takes action when appropriate. The committee also hears appeals regarding student petitions and requests to be readmitted to the college.

INTERDEPARTMENTAL COURSES

HE 1100 Critical Reading and Thinking

Fall, spring, or summer. 2 credits (credit toward graduation depends on individual college). Limited enrollment. Prerequisite: freshman or sophomore standing; juniors and seniors by permission of instructor. Letter or S-U grades. Staff.

Enables students to increase critical reading and thinking abilities. Examines theory and research associated with a wide range of reading, thinking, and learning skills. Emphasis is placed on developing and applying analytical and evaluative skills.

HE 1110 College Achievement Seminar

Summer, six-week session. 2 credits (credit toward graduation depends on individual college). Prerequisite: Pre-freshman Summer Program students. Letter or S-U grades. Staff.

Improves the study and learning skills of incoming freshmen. Emphasis is placed on acquisition of skills necessary to achieve academic success. Topics include time management, note-taking, mapping, textbook comprehension, exam preparation, and exam strategies. The application of theory to the demands of Cornell course work is stressed. In addition, students are introduced to library and computing resources through hands-on

HE 4070 Leadership in the Nonprofit Environment

Fall. 3 credits. Limited to 30 students. Letter grades only. B. Bricker.

The nonprofit sector contributes nearly 10 percent of U.S. GNP and employs 11 to 12 percent of citizens. This economic sector touches all our lives—as volunteers, donors, receivers of service, employees, or board members. This course provides an opportunity to explore the challenges and opportunities of the nonprofit sector. After becoming familiar with the issues and complications of strategic charitable giving, students will consider actual grant applications from community organizations and make decisions to award \$10,000 in grant aid. HE 4070 is made

possible by a generous gift of \$10,000 from the Sunshine Lady Foundation. Students learn to read, evaluate, and write effective grant proposals. They create a Request for Proposal (RFP) to invite community nonprofits to apply for funding. They study organizational missions, the strengths and challenges of private, not for profit organizations, the motivation for giving time and money, and many related themes.

HE 4991/4992 Biology & Society Honors Project I and II

Fall and spring (yearlong). Credit TBA. Students who are admitted to the honors program are required to complete two semesters of honors project research and to write an honors thesis. The project must include substantial research, and the completed work should be of wider scope and greater originality than is normal for an upper-level course. The student must find a project supervisor and a second faculty member willing to serve as faculty reader; at least one of these must be a member of the Biology and Society faculty. Minimally, an honors thesis outline and bibliography should be completed during the first semester. In consultation with the advisors, the director of undergraduate studies will evaluate whether the student should continue working on an honors project. Students should note that these courses are to be taken in addition to those courses that meet the regular major requirements.

THE URBAN SEMESTER PROGRAM IN MULTICULTURAL DYNAMICS IN URBAN AFFAIRS

Cornell in New York City provides students with many study options that focus on multicultural dynamics in urban affairs. The options available include internships, individual and group community service projects, research, independent study, collaborative learning, and mentorships. Students must enroll concurrently in the three courses HE 4700, 4800, and 4900 or 4950. Students learn through reflection and action. Program options are possible throughout the academic year, during winter break, and in the summer.

Courses of study enable students to seek out the relationship between theory and practice, apply theory to practice, identify and acquire professional practice skills, and learn about the impact of diversity on New York City. By applying ethnographic research techniques and methods, students learn to think conceptually, reflect on their actions, and be agents of change.

HE 4060 Fieldwork in Diversity and Professional Practice: The Culture of Medicine and Public Health

Summer, eight-week session. Variable credit. S. Beck.

This course is part of the Urban Semester Program in New York City. Students learn through a cycle of experience and reflection. Over the course of eight weeks, students learn how to implement experience-based learning techniques and perspectives to enhance their competencies as initiates of professional practice. Students spend four days each week in an internship of their own choosing. One day each week, students have discussions with

professionals who represent different aspects of the New York City economy. This exposure enables students to explore a variety of professional perspectives and practices. Students participate in reflections seminars with the director of the program to explore student internship experiences and learning.

HE 4080 Fieldwork in Diversity and Professional Practice: Community and Public Service

Summer, eight-week session. Variable credit. M. Cocchini.

This course is part of the Urban Semester Program in New York City. Students learn through a cycle of experience and reflection. Over the course of eight weeks, students learn how to implement experience-based learning techniques and perspectives to enhance their competencies as initiates of professional practice. Students spend four days each week in an internship of their own choosing. One day each week, students have discussions with professionals who represent different aspects of the New York City economy. This exposure enables students to explore a variety of professional perspectives and practices. Students participate in reflections seminars with the director of the program to explore student internship experiences and learning.

HE 4090 Fieldwork in Diversity and Professional Practice: Finance, Business, and Other Settings

Summer, eight-week session. Variable credit. M. Cocchini.

This course is part of the Urban Semester Program in New York City. Students learn through a cycle of experience and reflection. Over the course of eight weeks, students learn how to implement experience-based learning techniques and perspectives to enhance their competencies as initiates of professional practice. Students spend four days each week in an internship of their own choosing. One day each week, students have discussions with professionals who represent different aspects of the New York City economy. This exposure enables students to explore a variety of professional perspectives and practices. Students participate in reflections seminars with the director of the program to explore student internship experiences and learning.

HE 4700 Multicultural Issues in Urban Affairs

Fall and spring. 3 credits. Students must take course during semester they participate in Urban Semester Program. Staff.

Uses New York City as a classroom. The landscapes, built environments, and people in them are the texts. In the beginning, students study the formation of this multicultural city by traversing lower Manhattan and imagining New Amsterdam as it became New York City. Then they investigate a number of neighborhoods and speak with local leaders about diversity issues in context, in practice, and in use, to learn how multicultural issues are experienced by people and how they make sense of them.

HE 4800 Communities in Multicultural Practice

Fall and spring, 6 credits. Students must take course during semester they participate in Urban Semester Program. Staff.

Concerns urban children and youth in communities of color. Each week of the semester, students participate one day in the school lives of children pre-K through eighth grade in selected neighborhoods in New York City. Students keep journals of their reflections on their experiences and observations.

HE 4900 Multicultural Practice

Fall and spring, 6 credits. Students must take *either* HE 4900 *or* 4950 during semester they participate in Urban Semester Program; which is appropriate depends on student's placement and is determined by Urban Semester director. Staff.

Students explore the intersection of organizational culture with issues of diversity. They investigate the nature of organizational culture and how it engages and includes or does not include diversity. Students report back in seminars their understanding and analysis of their internship organizations and their industry's role in creating conditions and environments of inclusion or exclusion. The course explores the conditions and processes that have brought about inclusion or exclusion.

HE 4950 Culture, Medicine, and Professional Practice in a Diverse World

Fall and spring, 6 credits. Students must take *either* HE 4900 *or* 4950 during semester they participate in Urban Semester; which is appropriate depends on student's placement and is determined by Urban Semester director. Staff.

Students participate in several experiential learning environments related to medicine over the course of the semester. Students rotate in a four-week unit, supported by Pastoral Care and ER, as well as several other choices through the semester. Medical and health-related practitioners make presentations throughout the semester.

DESIGN AND ENVIRONMENTAL ANALYSIS

S. Danko, chair (3M29 MVR, 255-3165); P. Eshelman, director of undergraduate studies; J. Elliott, director of graduate studies; F. Becker, S. Curtis, J. Elliott, G. Evans, D. Feathers, K. Gibson, R. Gilmore, A. Hedge, Y. Hua, J. Jennings, J. Laquatra, N. Wells

Note: A minimal charge for photocopied course handouts may be required.

DEA 4+1 Master's Degree Program

Outstanding students who complete their four-year undergraduate degree in DEA may apply for a master of arts/M.A. (interior design) or a master of science/M.S. (human environment relations) degree that typically requires one additional year of graduate study.

Through careful planning by the beginning of their junior year, many of the courses required in the M.A. or M.S. programs can be taken during the undergraduate years, creating an opportunity to focus the fifth year of study on

completing graduate courses and thesis requirements. Typically, students will take four to five courses in their fall semester as a graduate student, and two to three courses plus their thesis research in the spring semester. Students should expect to complete their thesis by the end of the summer term of their fifth year.

Admission to the 4+1 Master's program is not automatic. Students must meet with their advisors early in their undergraduate programs to plan carefully for this possibility. In the fall of the senior year, interested students must submit an online application to the Graduate School. The GRE exam and a portfolio are not required for 4+1 applicants. In addition to the online application, 4+1 applicants must submit a 4+1 study proposal to the department. Students who have compiled a strong undergraduate record in the department are usually good candidates for admission into the graduate program in Design and Environmental Analysis.

DEA 1101 Interior Design Studio I (also VISST 1101)

Fall, 3 credits. Limited to 20 students per sec. Prerequisite: DEA majors; permission of instructor for nonmajors. Option I majors must take DEA 1101 in fall of first year. B- or higher in DEA 1101 required to take DEA 1102 and 1150. Must complete incomplete grade in DEA 1101 before taking 1102 and 1150. Cost of materials: approx. \$200. J. Elliott.

Introduces the fundamental vocabulary and principles of two- and three-dimensional design. Students experiment with the development of image and form through problem-solving activities. Visit <http://courses.cit.cornell.edu/dea1101>.

DEA 1102 Interior Design Studio II

Spring, 3 credits. Prerequisite: Option I DEA majors only. Option I majors must take DEA 1102 and 1150 concurrently. B- or higher in DEA 1102 required to take DEA 2201. Must complete incomplete grade in this course before taking DEA 2201. Cost of materials: approx. \$300; shop fee: \$10. P. Eshelman.

Studio course in three-dimensional design with an interior design emphasis. Explores problems in spatial organization through drawings and models.

[DEA 1110 Making a Difference: By Design

Fall, 3 credits. Limited to 130 students. Lab fee: \$25. Next offered 2010-2011. S. Danko.

This course focuses on issues of leadership, creative problem-solving, and risk-taking through case study examination of leaders in business, education, medicine, human development, science, and other areas who have made a difference using design as a tool for positive social change. Using a micro to macro framework, students examine how design affects their daily lives and future professions from the person to the planet. Additional topics include nurturing creativity, visual communications, socially responsible design and business, culture, and ecological issues.]

DEA 1150 Design Graphics and Visualization

Spring, 3 credits. Limited to 18 students. Prerequisite: Option I DEA majors only; DEA 1101 with grade of B- or higher. Corequisite: DEA 1102. B- or higher in DEA 1150 required to take DEA 2201. Must complete incomplete grade in this course before taking DEA 2201. Minimum cost of materials: \$200; technology fee: \$10. K. Gibson.

Introductory graphics course for interior designers. Emphasizes orthographic and perspective drawing, formal and conceptual presentation methods. Reinforces concepts through projects, readings, and field trips.

DEA 1500 Introduction to Human-Environment Relations (also COGST 1500)

Spring, 3 credits. Limited to 15 students per sec (20 sec). Lec, disc. G. Evans.

Human-Environment Relations is an interdisciplinary field concerned with how the physical environment and human behavior interrelate. Most of our attention will be focused on how residential environments and urban and natural settings affect human health and well-being. We also examine at how human attitudes and behaviors affect environmental quality. Hands-on projects plus exams. Lecture and discussion sections Writing in Major option also available.

DEA 2030 Digital Communications

Spring, 2 credits. Limited to 45 students. Priority given to DEA majors. Lab fee: \$10. J. Elliott.

Digital information technologies for designers of the built environment. Students explore issues in relation to text and image through analysis and composition of form and content. Through a series of projects the students work toward the development of a professional web-based portfolio of self-promotional materials. The primary objective is to reinforce principles of visual communications while learning the rudiments of vector, raster, and html graphic software. Visit <http://courses.cit.cornell.edu/dea2030>.

DEA 2040 Introduction to Building Technology

Spring, 2 credits. Y. Hua.

This course is an introduction to a wide range of building technology. The goal is to develop basic understanding of building systems, their implications for the planning, design, and operation processes of buildings, as well as the impact of their performance on building occupants and the environment. Topics include site and climate, structural systems, building envelope, passive strategies for building conditioning, HVAC systems, interior systems, lighting systems, acoustics, electrical systems, construction process and building maintenance, and principles of building systems integration for occupant comfort and environmental sustainability.

DEA 2150 Digital Graphics

Fall, first seven weeks of semester. 1 credit. Prerequisites: DEA majors or permission of instructor, DEA 1101. Letter grades only. S. Curtis.

This course will be an investigation into use of computer graphic software programs for the purpose of design, visualization, and presentation. The course will investigate the inherent differences between raster and vector graphics and how to use a variety of computer graphics programs such as Adobe

Photoshop, Illustrator, Sketch Up, and Acrobat to achieve a desired end result. Lab-based course providing technical illustration in Adobe Illustrator, Photoshop, and Sketch Up.

DEA 2201 Interior Design Studio III

Fall. 4 credits. Limited to 18 students. Prerequisites: Option I DEA students; DEA 1101, 1102, 1110, 1150, and 1500 (minimum grades of B-); B- or higher required to take DEA 2202. Must complete incomplete in 2201 before taking 2202. Corequisites: DEA 2510, DEA 2150, DEA 4600. Minimum cost of materials: \$150; lab fee: \$40; required field trip: approx. \$130. J. Jennings.

Third semester in the studio sequence of eight semesters. The theme and objectives focus on design as critical thinking, introducing means by which students can think, draw, write, and build their way critically through design. Taken concurrently with DEA 2510, the course applies historical theory to contemporary design projects. Also includes a collaborative project with a professor and students from another design discipline.

DEA 2202 Interior Design Studio IV

Spring. 4 credits. Prerequisites: Option I DEA students; DEA 2201 and 2030. Pre- or corequisite: DEA 2040. Must complete incomplete grade in this course before registering for DEA 3301. Minimum cost of materials: \$120; field trip fee. R. Gilmore.

Based on programmatic criteria from real clients, students learn how to design several types of interior environments, from health care facilities to local nonprofit agencies. Emphasis is on space planning, lighting design, construction of custom light fixtures, and service learning, where students use design to transform the facilities of social service agencies in the community.

DEA 2410 Introduction to Computer-Aided Design (CAD)

Spring, first seven weeks of semester. 1 credit. Prerequisites: DEA majors or permission of instructor; DEA 1101. Letter grades only. Minimum cost of materials: \$50. S. Curtis.

This course provides an understanding of, and experience with, electronic drafting on the microcomputer. It includes a basic understanding of the features, limitations, and considerations associated with the operation of the latest release of AutoCAD. By the end of the course, the student will be proficient enough with the AutoCAD software to draw and plot most projects required by their course of study as they relate to architecture and interior design.

DEA 2420 Advanced Computer-Aided Design (CAD)

Spring, second seven weeks of semester. 1 credit. Prerequisites: DEA majors or permission of instructor; DEA 1101. Letter grades only. Minimum cost of materials: \$50. S. Curtis.

This course provides a thorough understanding of the 2-D features, limitations, and considerations associated with the operation of the latest release of AutoCAD. This course builds on knowledge gained in DEA 2410 and requires DEA 2410 as a prerequisite. Commands and concepts such as multi-sheet plotting, xreference drawings, blocks and attributes, raster images, user coordinate systems, and customization of AutoCAD are covered. This course will give the student a high level of proficiency with the AutoCAD software as they relate to architecture and interior design.

DEA 2500 The Environment and Social Behavior

Fall. 3 credits. Limited to 16 students. Priority order: DEA seniors, juniors, sophomores, freshmen. Prerequisite: DEA 1500 and written permission of instructor. Field trip fee: \$65. G. Evans.

This course is about architecture and human behavior. It is centered on two key principles: 1. the complex interplay of social and personal factors with the physical environment largely determines how the built environment influences human well-being; 2. aesthetics is not sufficient in judging design—we must also consider how the built environment affects health, interpersonal relationships, and performance along with preference. Two major projects, one in collaboration with a design studio and a real community client.

DEA 2510 History and Theory of the Interior

Fall. 3 credits. Limited to 35 students. Priority given to DEA majors. J. Jennings.

A historic study of interior architecture and design with an emphasis on the concepts of design theory. Overarching themes encompass several time periods from the classical to the 20th century and isolate cultural patterns, spatial ideas, dialectics, design elements, and theorists. Reading, discussion, analytical exercises, essays, and a field trip are included. Visit <http://courses.cit.cornell.edu/dea2510>.

DEA 2550 Introduction to Facility Planning and Management

Fall. 2 credits. Letter grades only. F. Becker. Introduction to the field of facility planning and management. Focuses on how the planning, design, and management of an organization's physical facilities can help it meet its business objectives. Topics include the history of the field, strategic planning, space planning and design, project management, building operations, workplace change management, real estate, and computer-aided facility management systems.

DEA 3000 Special Studies for Undergraduates

Fall or spring. Credit TBA. DEA faculty. Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multicopy description of the study they want to undertake on a form available from the college registrar's office. The form, signed by both the instructor directing the study and the head of the department, is filed at course registration or during the change-of-registration period.

DEA 3030 Interior Materials and Sustainable Elements

Fall. 3 credits. Limited to 45 students. Prerequisite: interior design, hospitality, or architectural studio or permission of instructor. Approx. cost of materials: \$10. R. Gilmore.

A sustainable approach to the evaluation and selection of materials, finishes, and furnishings for the built environment has the potential to protect our planet. This course provides an introduction to sustainable sources and asks students to manipulate materials, understand performance testing, use building codes, create a life-cycle cost analysis, and complete interior specifications. Field trips provide an overview of the manufacturing process, and group projects culminate in the presentation of research on current "green" products and resources.

DEA 3040 Introduction to Professional Practice of Interior Design

Spring. 1 credit. Limited to 15 students. Prerequisite: Option I DEA students. DEA faculty.

Introduction to organizational and management principles for delivery of interior design and facility management services. Covers basic organizational structures and basic management functions within interior design and facility management organizations, work flow and scheduling, business practices, legal and ethical responsibilities and concerns, contracts, basic contract documents such as working drawings and specifications, supervision of construction and installation, and cost estimation.

DEA 3050 Construction Documents and Detailing

Spring. 2 credits. Prerequisites: DEA 3301 and 3030 or permission of instructor. Corequisite: DEA 3302. Minimum cost of materials: \$50; required field trips: \$10. R. Gilmore.

A continuous dialogue between the idea for an interior space and the reality of its final built form is contained within construction documents, also known as working drawings and specifications. Students study the history of architectural documentation, the organization of construction drawings, schedules, and specifications, and the detailing of interior elements and construction methods by touring a local millwork shop. Each student completes a comprehensive set of construction documents.

DEA 3250 Human Factors: Ergonomics-Anthropometrics

Fall. 3 credits. Recommended: DEA 1500. Undergraduate sec of DEA 6510; shares lec but meets for an additional hour. DEA 6510 has additional readings and projects. A. Hedge.

Implications of human physical and physiological characteristics and limitations on the design of settings, products, and tasks. An introduction to engineering anthropometry, biomechanics, control/display design, work physiology, and motor performance. Includes practical exercises and field project work. Visit <http://ergo.human.cornell.edu>.

DEA 3301 Interior Design Studio V

Fall. 5 credits. Prerequisites: DEA 1110, 1500, 2201, 2202, 2030, and 2040. Corequisites: DEA 3030 and 4590. Must complete incomplete grade in this course before registering for DEA 3302. Minimum cost of materials: \$150; shop fee: \$10; optional field trip: approx. \$10. P. Eshelman.

This intermediate-level interior design studio focuses on design for a special population inclusive of young children, older adults, and people of any age living with a congenital or hereditary condition, injury, or disease. The course is organized around a semester-long project broken into four phases: pre-design, design, full-scale model construction, and design documentation and presentation. Collaboration with students in DEA 2500/6600 provides experience in the application of evidence-based information in the design process.

DEA 3302 Interior Design Studio VI

Spring. 5 credits. Limited to 18 students. Prerequisites: DEA 3301 and 3030 or permission of instructor. Corequisite: DEA 3050. Must complete incomplete grade in this course before registering for DEA 4401. Minimum cost of materials: \$200; shop fee: \$10; field trip fee: \$20. K. Gibson.

Sixth semester in the studio sequence of eight semesters. Emphasizes use of the microcomputer as a creative tool in the design process. Explores social, cultural, and physical factors related to the interior environment through assignments, readings, and a field trip. Design and problem-solving skills are reinforced according to project type.

DEA 3500 Human Factors: The Ambient Environment

Spring, 3 credits. Recommended: DEA 1500. Undergraduate sec of DEA 6520; shares lec but meets for an additional hour. DEA 6520 has additional readings and projects. A. Hedge.

Introduces human-factor considerations in lighting, acoustics, noise control, indoor air quality and ventilation, and the thermal environment. Views the ambient environment as a support system that should promote human efficiency, productivity, health, and safety. Emphasizes the implications for planning, design, and management of settings and facilities. Visit <http://ergo.human.cornell.edu>.

DEA 3540 Facility Planning and Management Studio

Spring, 4 credits. Prerequisite: DEA 4590 or permission of instructor. Letter grades only. Minimum cost of materials: \$200. Y. Hua.

For advanced undergraduates interested in facility planning and management. Purpose is to provide basic tools, techniques, and concepts useful in planning, designing, and managing facilities for large, complex organizations. Covers strategic and tactical planning for facilities, organizing to deliver facility management services, project management, space forecasting, space allocation policies, programming, relocation analysis, site selection, building assessment, space planning and design, furniture specifications, and moves. Considers sociopsychological, organizational, financial, architectural, and legal factors.

DEA 4000-4010-4020-4030 Special Studies for Undergraduates

Fall or spring. Credit TBA. S-U or letter grades. DEA faculty.

For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of DEA not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multicopy description of the study they want to undertake on a form available from the department office. This form must be signed by the instructor directing the study and the director of undergraduate studies and filed at course registration or within the change-of-registration period in the college registrar's office, 146 MVR, along with an add/drop slip. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the department head is necessary. Students, in consultation with their advisors and the instructor should register for one of the following subdivisions of independent study.

DEA 4000 Directed Readings

For study that predominantly involves library research and independent reading.

DEA 4010 Empirical Research

For study that predominantly involves data collection and analysis or laboratory or studio projects.

DEA 4020 Supervised Fieldwork

For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

DEA 4030 Teaching Apprenticeship

For study that includes teaching methods in the field and assisting faculty with instruction. Students must have demonstrated a high level of performance in the subject to be taught and in the overall academic program.

DEA 4100 Facility Planning and Design in a Diverse Society

Spring, 3 credits. Prerequisites: DEA 1500, 1110, 2500, 6530, or permission of instructor. Letter grades only. L. Maxwell.

This is an upper-level undergraduate course appropriate for undergraduate and graduate students in facility planning and management, human environment relations and interior design students in DEA as well as students outside of DEA who are interested in how the built environment should respond to a diverse society. The course will examine facility planning and design issues in a diverse society. Specifically, the role of culture, gender, stage in the life cycle, and disability in planning facilities of various types will be studied. This course will examine the issues of diversity from two perspectives. One, how are the implicit and explicit assumptions about the user expressed in various aspects of the built environment in our society; and two, how do we purposely plan facilities in a diverse society.

DEA 4150 Strategic Facility Planning for Social Institutions

Spring, 3 credits. Prerequisites: DEA 1500, 2500, 4590, or permission of instructor. Letter grades only. L. Maxwell.

This is an upper-level undergraduate course appropriate for undergraduate and graduate students in facility planning and management, the Sloan program, urban planning, and design/architecture students interested in facility planning and design issues for health care institutions. The course will examine the facility planning and management issues that affect the healthcare industries. The course will specifically look at how these facilities respond to changes in (1) the needs of their target population, (2) technology and communications, (3) sustainability, (4) healthcare delivery practices, and (5) regulatory and policy issues related to the healthcare industry. The course will specifically examine all of these issues in the long-term care industry.

DEA 4220 Ecological Literacy and Design (also ARCH 4601)

Spring, 3 credits. Prerequisite: junior or senior standing. Letter grades only. Cost of field trips: approx. \$25. J. Elliott.

Lecture/seminar course for advanced undergraduates interested in learning about the effects of designing the built environment on the biophysical world. Course objectives are to develop sensitivities to environmental issues, construct conceptual frameworks for analysis, and demonstrate how ecological knowledge can be applied to the practice of

design through researching the use of the LEED building certification process for real world clients and stakeholders. Visit <http://courses.cit.cornell.edu/dea4220>.

[DEA 4230 Restaurant Design Charrette

Spring, 1 credit. Limited to 18 students. Prerequisite: permission of instructor. Letter grades only. Minimum cost of materials: \$50. Next offered 2010-2011. R. Gilmore and S. Robson.

This intensive weekend-long course pushes the boundaries of current restaurant design by developing a concept plan for an innovative restaurant in a nontraditional setting. Students work in teams to develop design solutions and prepare design presentations for review by course instructors and visiting design professionals.]

DEA 4300 Furniture as a Social Art

Spring, 3 credits. Limited to 15 students. Prerequisite: permission of instructor. Cost of building materials: \$150. (Additional shop hours are made available.) P. Eshelman.

The focus is on how innovation in furniture design is inspired. Four sources of inspiration explored are: user needs; aesthetic interpretation; material and manufacturing technologies; and environmental impact. The interplay among these four sources of inspiration will be examined with emphasis on the first, user needs. Assignments involve both analyzing furniture products currently on the market and designing and constructing a furniture piece for a special population inclusive of young children, older adults, and people of any age living with a congenital or hereditary condition, injury, or disease.

DEA 4401 Interior Design Studio VII

Fall, 5 credits. Prerequisites: DEA 3302, 3030, 3040, and 3050. Must complete incomplete grade in this course before registering for DEA 4402. Minimum cost of materials: \$150; field trip: \$50. R. Gilmore.

Comprehensive historic preservation design studio in which students complete each phase of the adaptive reuse of a historic structure. After site visit and historic survey work, students conduct demographic research, complete a building assessment, and design a new use for a viable, yet older structure. Lecture topics range from professional practice strategies, to the history of preservation, to the Secretary of the Interior's Standards for Rehabilitation. Components of the work include program documents, code compliance, concept development, schematic and design development presentations, and construction documents.

DEA 4402 Interior Design Studio VIII

Spring, 5 credits. Prerequisites: DEA 3301, 3302, 3030, and 3040. Minimum cost of materials: \$150. S. Danko.

Completion of advanced interior design problems broken into five phases: programming; schematic design and evaluation; design development, including material and finish selection; design detailing; and in-process documentation and the preparation of a professional-quality design presentation.

DEA 4530 Planning and Managing the Workplace

Fall, 3 credits. Prerequisite: junior or senior standing. F. Becker.

Through lectures, readings, and a field studies project, this course explores how the

planning, design, and management of health care facilities affects the experience of patients and care-giving staff; and the relationship of these outcomes to healthcare quality.

DEA 4540 Computer-Aided Facilities Management

Fall, second seven weeks of semester. 1 credit. Prerequisites: none. Letter grades only. S. Curtis.

This course will be an investigation into the use of computer-aided facilities management software in facilities management. Emphasis will be placed initially on understanding how FM CAD systems work. Topics such as Building a Space Inventory Database, Adding Occupancy Data, AutoCAD commands, Reports, Asset Management, and Strategic Planning and Stacking will be learned and discussed.

[DEA 4550 Research Methods in Human-Environment Relations]

Fall. 3 credits. Prerequisite: DEA majors or permission of instructor; statistics course. Next offered 2010-2011. N. Wells.

Develops students' understanding and competence in the use of research and analytical tools to study the relationship between the physical environment and human behavior. Emphasizes evaluation of internal and external validity as well as measurement reliability and validity. Topics include research design, unobtrusive and obtrusive data-collecting tools, the processing of data, and effective communication of empirical research findings.]

DEA 4590 Programming Methods in Design

Fall. 3 credits. Letter grades only. Minimum cost of materials: \$100. L. Maxwell.

Introduction to facility programming. Emphasizes formulation of building requirements based on user characteristics and potential constraints. The course presents diverse methods for determining characteristics that will enable a particular environmental setting to support desired behaviors of users. The course emphasizes selection of appropriate methods to suit the specific user/client needs. Students will work with an actual client to prepare a program document.

[DEA 4600 Design City]

Fall. 1 credit; may be repeated for credit. Prerequisite: DEA majors; permission of instructors. Not open to freshmen for credit. Students are required to take this course in order to participate in field study trip to a major city. Field trip fee covers cost of hotel and chartered bus; trip fee will be billed to student's bursar account. S-U grades only. Next offered 2010-2011. K. Gibson and J. Jennings.

Field study of historic and contemporary interiors with guided tours to architectural and interior design firms, installations, exhibits, and showrooms in New York City, Toronto, or other major cities. Topics and themes change yearly.]

DEA 4700 Applied Ergonomic Methods

Spring. 3 credits. Prerequisite: DEA 3250. Undergraduate sec of DEA 6700; shares lec but meets for an additional hour. DEA 6700 has additional readings and projects. A. Hedge.

Covers physical and cognitive ergonomics methods and techniques and their application to the design of modern work environments. Emphasizes understanding key concepts.

Covers conceptual frameworks for ergonomic analysis, systems methods and processes, a repertoire of ergonomics methods and techniques for the analysis of work activities and work systems.

DEA 4720 Environments for Elders: Housing and Design for an Aging Population

Spring. 3 credits. Field trip fee: \$20. N. Wells.

Through seminars, lectures, field trips, and service learning opportunities, students examine the relationship between older adults and the physical environment. Students gain understanding of the relevance of design characteristics to the well-being of older people; an appreciation of late-life social, cognitive, and physiological changes; as well as familiarity with a variety of housing options for late life. Visit <http://courses.cit.cornell.edu/dea4720>.

DEA 4990 Senior Honors Thesis

Fall or spring. Variable credit. Prerequisite: permission of thesis advisor and DEA director of undergraduate studies. Letter grades only. DEA faculty.

Opportunity for DEA majors to undertake original research and scholarly work leading to the preparation of a thesis. Students work closely with their thesis advisor on a topic of interest.

DEA 6000-6030 Special Problems for Graduate Students

Fall or spring. Credit TBA. S-U or letter grades. DEA faculty.

Independent advanced work by graduate students recommended by their special committee chair and approved by the head of the department and instructor.

6000: Special Problems. For study of special problems in the areas of interior design, human environment relations, or facilities planning and management.

6010: Directed Readings. For study that predominantly involves library research and independent study.

6020: Graduate Empirical Research. For study that predominantly involves collection and analysis of research data.

6030: Graduate Practicum. For study that predominantly involves field experiences in community settings.

DEA 6450 Dancing Mind/Thinking Heart: Creative Problem-Solving Theory and Practice

Spring. 3 credits. Limited to 24 students. Prerequisite: graduate or advanced undergraduate standing; undergraduates must have permission of instructor. S. Danko.

Focuses on thinking processes and techniques that support creative problem solving. Examines theories of creative behavior and critical thinking. The course is highly participatory and experiential by design. Weekly discussions include hands-on applications of theories on short problems tailored to the backgrounds of the students. The primary goal is to demonstrate perceptual, emotional, intellectual, cultural, and environmental blocks to creative thinking and expand the student's repertoire of creative problem solving strategies for use in day-to-day professional practice. Case studies of creative individuals and organizations from a variety of fields are presented.

[DEA 6480 Virtual Design, Analysis, and Representation]

Fall. Variable credit; max. 4. Limited to 15 students. Prerequisite: graduate or advanced undergraduate standing; for undergraduates, DEA 3302 or permission of instructor. Minimum cost of materials: \$150; lab fee: \$35. Next offered 2010-2011. K. Gibson.

Advanced use of computer technology to create and analyze interior environments. Emphasizes the use of 3-D modeling, animation, photorealistic rendering, and emerging technologies to investigate dynamic design issues.]

DEA 6500 Programming Methods in Design

Fall. 4 credits. L. Maxwell.

This course is intended for graduate students in cooperation with DEA 4590. Each student is required to attend DEA 4590 lectures, complete all required readings and assignments, and meet with the instructor and with other graduate students. An additional programming project will be required for all graduate students.

DEA 6510 Human Factors: Ergonomics-Anthropometrics

Fall. 4 credits. Recommended: DEA 1500 and 3-credit statistics course. A. Hedge.

Intended for graduate students who want a more thorough grounding in human factors than is provided by DEA 3250. Each student is required to attend DEA 3250 lectures, meet with the instructor and other graduate students for an additional class each week, and complete additional readings and projects. For more detail, see DEA 3250.

DEA 6520 Human Factors: The Ambient Environment

Spring. 4 credits. Recommended: DEA 1500. A. Hedge.

Intended for graduate students who want a more thorough grounding in human factors considerations than is provided by DEA 3500. Each student is required to attend DEA 3500 lectures, meet with the instructor and other graduate students for an additional class each week, and complete additional readings and projects. For detailed description, see DEA 3500.

DEA 6530 Planning and Managing the Workplace

Fall. 4 credits. Prerequisite: graduate standing. Letter grades only. F. Becker.

Through lectures, readings, and a field studies project, this course explores how the planning, design, and management of health care facilities affects the experience of patients and care-giving staff; and the relationship of these outcomes to healthcare quality.

DEA 6540 Facility Planning and Management Studio

Spring. 4 credits. Prerequisite: DEA 4590/6500 or permission of instructor. Letter grades only. Minimum cost of materials: \$200. Y. Hua.

For graduate students interested in facility planning and management. For description, see DEA 3540.

[DEA 6560 Research Methods in Human-Environment Relations]

Fall. 4 credits. Prerequisite: DEA majors or permission of instructor; statistics course. Next offered 2010–2011. N. Wells.

Intended for graduate students who want a more thorough understanding of the use of research to study the relationship between physical environment and human behavior than is provided by DEA 4550. Each student is required to attend DEA 4550 lectures, meet with the instructor and other graduate students for an additional class each week, and complete additional readings and projects. For more detail, see DEA 4550.]

DEA 6590 Introduction to Facility Planning and Management

Fall. 1 credit. For graduate students interested in careers in facility planning and management. Letter grades only. F. Becker.

Introduction to the field of facility planning and management. Focuses on how the planning, design, and management of an organization's physical facilities can help it meet its business objectives. Topics include the history of the field, strategic planning, space planning and design, project management, building operations, workplace change management, real estate and computer-aided facility management systems.

DEA 6600 The Environment and Social Behavior

Fall. 4 credits. Prerequisite: DEA 1500 and written permission of instructor. Field trip fee: \$65. G. Evans.

This course is about architecture and human behavior. It is centered on two key principles: 1. the complex interplay of social and personal factors with the physical environment largely determines how the built environment influences human well-being; 2. aesthetics is not sufficient in judging design—we must also consider how the built environment affects health, interpersonal relationships, and performance along with preference. Two major projects, one in collaboration with a design studio and a real community client.

DEA 6610 Environments and Health

Spring. 3 credits. N. Wells.

Examines the impact of the physical environment on human health and well-being through the life course. Environmental factors examined include characteristics of the built and natural environment, housing, and neighborhood as well as sprawl, the dominance of the automobile, and patterns of American landscape development. Health outcomes include physical health, obesity, mental health, and cognitive functioning. Working within the life course perspective, the course focuses particularly on environmental factors that may act as either protective mechanisms fostering the long-term resilience of individuals or risk factors contributing to long-term vulnerability.

DEA 6680 Design Theory and Criticism Seminar

Spring. 4 credits. Limited to 15 students. Letter grades only. J. Jennings.

For advanced undergraduate and graduate students. The seminar explores two methods of design thinking: theoretical and critical. One method stems from a desire to understand historical theory and to assess the relevance of theory as an intellectual basis for contemporary design. The other approach involves learning to write critically. Within this

construct is the notion that every design is an argument a designer makes.

DEA 6700 Applied Ergonomics Methods

Spring. 4 credits. Limited to 20 students.

Prerequisite: DEA 6510. A. Hedge.

Intended for graduate students who want a more thorough understanding of applied ergonomics methods than is provided by DEA 4700. Each student is required to attend DEA 4700 lectures, meet with the instructor and other graduate students for an additional class each week, and complete additional readings and projects. For further detail, see DEA 4700.

DEA 6760 Universal Design: Ergonomics and Accessibility

Spring. 3 credits. Recommended prerequisite: DEA 1500, 3250, or 6510, or permission of instructor. S–U or letter grades (DEA Option III students must do letter grade). D. Feathers.

Universal design accommodates and fosters human function, preferences, choice and identity through the design of the built environment. This course introduces the concepts of universal design from a human factors/ergonomics perspective and outlines precepts and regulations to support environmental design decisions that accommodate individuals that vary by factors such as age, gender, and ability. Universal design concepts are also discussed throughout one's life course. Student projects emphasize evaluating the built environment from a universal design perspective.

DEA 8990 Master's Thesis and Research

Fall or spring. Credit TBA. Prerequisite: permission of graduate committee chair and instructor. S–U or letter grades. DEA graduate faculty.

DEA 9990 Ph.D. Thesis and Research

Fall or Spring. Credit TBA. Prerequisite: permission of doctoral thesis committee chair and instructor. S–U or letter grades. DEA Ph.D. graduate faculty.

FIBER SCIENCE & APPAREL DESIGN

A. Lemley, chair (209 MVR, 255-3151); M. Frey, director of graduate studies; C. Jirousek, director of undergraduate studies; S. Ashdown, N. Breen, C. C. Chu, C. Coffman, J. Hinestroza, V. D. Lewis, F. Mete, A. Netravali, S. K. Obendorf, A. Racine

FSAD 1140 Introduction to Computer-Aided Design

Fall. 3 credits. Limited to 14 students per sec. Priority given to FSAD students and those in transfer process to FSAD. S–U or letter grades. Minimum cost of materials: \$100. A. Racine.

Explores the creative potential of microcomputers for fashion design. Uses AutoCAD software program as a design tool for drawing 2-D images. Introduces basic Photoshop software functions to enhance original drawings. Projects include creating full-scale engineered designs on fabric for digital printing in the studio, and a team-based fashion magazine.

FSAD 1170 Fashion Graphics

Spring. 3 credits. Limited to 21 students. Priority given to apparel design students. Prerequisite: basic drawing course. Letter grades only. Minimum cost of supplies: \$200; lab fee: \$30. V. D. Lewis.

Students develop both familiar and unfamiliar methods that enable them to visualize the fashioned body and ancillary expressions of fashion. Fashion graphics is explored as a communicative strategy essential in most aspects of fashion development.

FSAD 1250 Art, Design, and Visual Thinking

Fall. 3 credits. S–U or letter grades. C. Jirousek.

Introduction to the visual arts and design that explores aesthetic and cross-cultural dimensions of visual experience. Augmented by slide presentations, artifacts, video, and an Internet-based electronic textbook, lectures emphasize the varieties of visual expression seen in works of art and design. Discusses social, cultural, and historic interpretations of visual expression.

FSAD 1350 Fibers, Fabrics, and Finishes

Spring. 3 credits. FSAD majors must also enroll in FSAD 1360. S–U or letter grades. A. Netravali.

Introduction to fibers, fibrous materials, and dyes and finishes. Gives special emphasis to the use of fibrous materials in apparel, residential and contract interiors, and industrial applications. Topics include fiber properties, fabric structure, coloration of fibrous materials, dimensional stability, flammability, product specifications, and performance standards.

FSAD 1360 Fiber and Yarn Analysis Laboratory

Spring. 1 credit. Corequisite: FSAD 1350. Letter grades only. A. Netravali.

Consists of 14 laboratory sessions, in which students learn techniques to identify and test fibers and yarns. A midterm and final exam are based on using the methods learned to identify an unknown fiber (midterm) and an unknown bi-component yarn (final).

FSAD 1450 Introduction to Fashion Design

Spring. 4 credits. Limited to 30 students; 15 per lab. Priority given to FSAD students and students transferring into FSAD. Prerequisite: FSAD 1140. Corequisites: FSAD 1350 and 1360. Letter grades only. Apparel design majors should take course during first year. Minimum cost of materials: \$200. A. Racine.

Intensive study of principles and processes of flat-pattern design with emphasis on creative expression in upscale children's fashions. Through studio projects, students develop an understanding of the techniques needed to produce apparel from technical sketches, flat pattern design processes, and garment assembly.

FSAD 2370 Structural Fabric Design

Fall. 3 credits. Prerequisite: FSAD 1350. Recommended: college algebra. S–U or letter grades. M. Frey.

Covers the elements of technical fabric design with an emphasis on woven and knitted fabrics. Topics include structure of woven and knitted fabrics, openness, manufacturability, equivalence, and color effects.

FSAD 2640 Draping

Fall. 4 credits. Limited to 30 students; 15 per lab. Prerequisites: FSAD 1250 and 1450. Recommended: drawing course. Letter grades only. Minimum cost of materials: \$250; lab fee: \$10. F. Mete.

This studio course examines the process of creating a three-dimensional garment from the

two-dimensional fabric. The principles and processes of draping, advanced flat pattern making, and fitting are studied through projects. Drawing exercises focus on the communication of three-dimensional garments in two-dimensional sketches. Assigned problems require students to make judgments regarding the design process, the nature of materials, body structure, function, and fashion.

FSAD 2650 Patternmaking for Fashion Design

Spring. 3 credits. Limited to 30 students. Prerequisites: FSAD 1140, 1170, 1250, 1450, 1350, and 1360. Corequisite: FSAD 2370. Letter grades only. Minimum cost for fabrics, studio, and portfolio supplies: \$250. A. Racine.

The goal of this apparel studio course is to expand student competencies in flat pattern design, technical sketching, and fitting. Students generate original design concepts using fashion sources from historic to contemporary times. Advanced garment assembly and detailing techniques for fashion apparel with Sonobond Technology are introduced.

FSAD 2660 Apparel Design: Product Development

Spring. 3 credits. Prerequisites: FSAD 1140 and 1450. Recommended: drawing course. Letter grades only. Minimum cost of materials: \$150; lab fee: \$10. S. Ashdown.

Project-based course in which students explore the relationship between technology and design, and the impact of production issues on manufactured clothing. Students learn computer-aided patternmaking, grading, manufacturing technologies, communication of technical details, flats, specifications, and costing of garments. Designs are developed to various stages from conceptual work to full specification of the product and its production details, with a concentration on the iterative design process.

FSAD 3000 Special Studies for Undergraduates

Fall or spring. Credit TBA. Staff. Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multicopy description of the study they want to undertake on a form available from the college registrar's office. The form, signed by both the instructor directing the study and the department chair, is filed at course registration or during the change-of-registration period.

FSAD 3250 Color and Surface Design of Textiles

Fall. 4 credits. Limited to 18 students. Priority given to FSAD apparel design majors. Recommended: FSAD 1140 and 1350. Letter grades only. Minimum cost of materials: \$100; lab fee: \$100. C. Jirousek.

Studio experience in the surface design of textiles combined with exercises in color theory. Textile projects use techniques such as block printing, shibori, batik, silk painting, silk screen, and stitchery to produce a portfolio of textile designs. Studio work is augmented by lectures on pattern and color theory illustrated by slides and textile examples.

FSAD 3350 Fiber Science

Fall. 3 credits. Limited to 20 students. Prerequisites: college chemistry and physics. S-U or letter grades. A. Netravali.

Covers fibers commonly used in various engineering, medical, and apparel applications. Topics include the nature of polymer molecules, the chemical structure of organic fibers, inorganic fibers, micro-macro structure of fibers, fiber dimensions, environmental effects, and mechanical, optical, thermal, and frictional properties of fibers. The following fiber uses are discussed: composites in aerospace and other structural components, circuit boards, bulletproof vests, sutures, artificial arteries, geotextiles, sporting goods, and others.

FSAD 3460 Design Process

Fall. 4 credits. Limited to 30 students. Prerequisites: FSAD 1350, 1450, 2640, and 2650. Letter grades only. Minimum cost of materials: \$250; lab fee: \$10. V. D. Lewis.

The course exposes students to dilemmas and methods used by creative Fashion designers. Course ambitions are to develop personal design handwriting, unite a provocative design issue with the requirement of the market and functionality while emphasizing quality and creativity in realizing design ideas.

FSAD 3690 Style, Fashion, and the Apparel Industry

Fall. 2 credits. Limited to 30 students. Not open to freshmen. Prerequisites: FSAD 1250, 1350, and 2370. Students should not take FSAD 3690 and FSAD 3460 in same semester. Letter grades only. A. Racine.

Illustrated lectures focus on changes in the U.S. apparel industry and fashion cycles from the 19th century to the present day resulting from social forces, technological developments, and shifting demographics. The Cornell Costume Collection is used for discussion. Students write an original research paper on topics relating to changes in fashion over time.

FSAD 4000-4010-4020-4030 Special Independent Studies for Undergraduates

Fall, summer, or spring. Credit TBA. S-U or letter grades. Staff.

For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of FSAD not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multicopy description of the study they want to undertake on a form available from the department office. This form must be signed by the instructor directing the study and the department chair and filed at course registration or within the change-of-registration period after registration along with an add/drop slip in the college registrar's office (146 MVR). To ensure review before the close of the course registration or change-of-registration period, early submission of the special-studies form to the department chair is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

FSAD 4000: Directed Reading. For study that predominantly involves library research and independent reading.

FSAD 4010: Empirical Research. For study that predominantly involves data collection and analysis, or laboratory or studio projects.

FSAD 4020: Supervised Fieldwork. S-U grades only. For study that involves both responsible participation in a community setting and reflection on that experience

through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

FSAD 4030: Teaching Apprenticeships. Fall or spring. 2-4 credits. Prerequisites: upper-class standing, demonstrated high level of performance in subject to be taught and in overall academic program, and permission of instructor and department chair. S-U or letter grades. Staff. Apprenticeship includes both a study of teaching methods in the field and assisting the faculty with instruction.

[FSAD 4200 History of Color and Design in Textiles]

Spring. 3 credits. Prerequisite: FSAD 1250 or permission of instructor. S-U or letter grades. Offered alternate years; next offered 2010-2011. C. Jirousek.

History of textile design; color theory, trends and measurement; design use of pigments and dyes. Students complete hands-on exercises, two exams and a paper.]

FSAD 4310 Apparel Production and Management

Spring. 3 credits. Limited to 40 students. Prerequisites: ECON 1110 and 1120 and upper-division course in either apparel or textiles. S-U or letter grades. F. Mete.

Introduction to the global textile and apparel industry, particularly the technical and economic aspects of apparel production and strategic management. Includes analysis of specific apparel manufacturing and management issues such as international sourcing, strategies, Fast Fashion, Quick Response, mass customization, production and information technology, labor, and logistics. Students will analyze and discuss case studies of creative individuals and organizations from a variety of fields that apply to the textile and apparel industry.

FSAD 4320 Product Quality Assessment

Spring. 3 credits. Limited to 36 students in lec, 18 per lab. Prerequisites: FSAD 1350 and statistics course. S-U or letter grades. Lab fee: \$20. N. Breen.

Covers evaluation of fibers, yarns, fabrics, and garments, with emphases on the meaning of standards, testing philosophy, quality control, and statistical analysis. Discusses day-to-day tests done in the textile and apparel industry. Laboratory sections introduce students to various test methods, data generation for analysis, and evaluation.

FSAD 4360 Fiber Chemistry

Spring. 3 credits. Prerequisite: senior or first-year graduate standing. S-U or letter grades. Offered alternate years. C. C. Chu.

Discusses the chemical and physical structure of several commercially important fibers, such as cotton, wool, silk, polyesters, nylons, acrylics, polyolefins and spandex, and their polymerization process. Gives the general chemical and physical properties of each. Discusses degradation reactions for certain fibers such as polyolefins and acrylics.

FSAD 4390 Biomedical Materials and Devices for Human Body Repair (also BME 5390)

Spring. 2-3 credits. Prerequisites: junior or senior standing; college natural science requirement (chemistry or biology). S-U grades only for 2 credits, letter grades only for 3 credits. C. C. Chu.

Surveys materials and devices for repair of injured, diseased, or aged human tissues/organs. Includes properties of synthetic and

biological materials, wound healing processes, medical devices for repair of wounds, blood vessels, hearts, joints, bones, nerves, male impotence, vision/hearing/voice, and drug control/release.

FSAD 4440 Apparel/Textile Retailing and Distribution

Fall. 3 credits. Prerequisites: junior or senior standing; FSAD 1350 and marketing course. S–U or letter grades. N. Breen.

Overview of the business of design, production, distribution, marketing, and merchandising of apparel and related products from a management perspective. Includes the organization and structure of both domestic and international retailers along with pricing strategies, merchandise planning, inventory management, and sales promotion. New uses of computer systems and information technologies are emphasized throughout.

FSAD 4660 Textiles, Apparel, and Innovation

Fall. 3 credits. Prerequisite: FSAD 2370. Recommended: FSAD 4320. S–U or letter grades. Cost of field trip: \$100. J. Hinestroza.

Designed for students in all FSAD options. Explores the relationship between materials and design with a concentration on the use of innovative textile materials in apparel. Both aesthetic and functional issues are addressed. The course consists of a combination of lecture, discussion of readings, oral reports, a research paper, and project work. There is a one-day field trip to New York City.

FSAD 4700 Fashion Presentation: Portfolio Development

Fall. 3 credits. Limited to 25 students. Prerequisites: FSAD 1170, 2640, 2650, and 3460. Minimum cost of materials: \$250. V. D. Lewis.

Students are expected to discover their personal philosophy of fashion and to discover and adopt current presentation techniques. Students gain an understanding of presentation methods currently used in Fashion design, forecasting, and editorial illustration. Skills covered include fashion illustration, image manipulation, and photographic image, layout, and presentation.

FSAD 4990 Honors Thesis Research

Fall and spring. 4 credits each in fall and spring semesters of senior year. Prerequisites: minimum GPA of 3.3 and submission of application in junior year. S–U or letter grades. Staff.

Student will prepare a thesis, based on independent research, including a research statement, background, approach, results (which could be a description of a creative work), and discussion. The student may also produce creative work. Student will have an open presentation of work, either a seminar or an exhibition, and an oral defense with the committee. Interested students should obtain a FSAD Honors Program application form from the FSAD undergraduate office (207 MVR), and submit the application to the department before the end of the fall semester of junior year. For more information students should contact the director of undergraduate studies.

FSAD 6000 Special Problems for Graduate Students

Fall or spring. Credit TBA. S–U or letter grades. Staff.

Independent advanced work by graduate students recommended by their chair and

approved by the department chair and instructor.

FSAD 6160 Rheology of Solids: Dynamic Mechanical Analysis of Fibers and Polymers

Fall. 3 credits. S–U or letter grades. Offered alternate years. J. Hinestroza.

This course will introduce students to Dynamic Mechanical Analysis (DMA) and its relevance in the characterization of polymer fibers and films. DMA is a materials characterization technique that supplies information about major transitions as well as secondary and tertiary transitions not readily identifiable by other methods. It also allows characterization of bulk properties directly affecting material performance. DMA can also be used to predict the behavior of polymeric materials as a function of time and their exposure to liquids and gases over a wide range of temperatures.

[FSAD 6200 Physical Properties of Fiber-Forming Polymers and Fibers

Spring. 3 credits. Prerequisite: permission of instructor. Offered alternate years; next offered 2010–2011. A. Netravali.

Covers formation and properties of fiber-forming polymers, their states and interconnection. Discusses relationship between chemical structure and morphology of fibers on their properties and testing methods.]

[FSAD 6260 The Chemistry of Textile Finishes and Dyeing

Spring. 3 credits. Prerequisites: organic chemistry course or permission of instructor. S–U or letter grades. Offered alternate years; next offered 2010–2011. C. C. Chu.

Studies industrially important textile chemicals used for dyeing and enhancing fiber and fabric properties, such as durable press, anti-soiling, water repellency.]

FSAD 6370 Research Seminars in Apparel Design

Fall and spring. 1 credit; repeat of course each semester encouraged for all apparel design graduate students. Prerequisites: permission of individual instructor for advanced undergraduates. S–U grades only. Apparel Design faculty.

[FSAD 6390 Mechanics of Fibrous Assemblies

Spring. 3 credits. Prerequisite: solid mechanics course or permission of instructor. S–U or letter grades. Offered alternate years; next offered 2010–2011. J. Hinestroza.

Studies the mechanics of fiber assemblies: bending and buckling; and the mechanical behavior of nonwoven textile materials.]

[FSAD 6640 Human Factors: Anthropometrics and Apparel

Spring. 3 credits. Open to advanced undergraduates. Prerequisites: statistics course and permission of instructor. S–U or letter grades. Offered alternate years; next offered 2010–2011. S. Ashdown.

Seminar course focusing on anthropometrics and human variation, development of sizing systems for clothing, and the impact of new technologies such as the 3D body scanner on apparel design and distribution.]

FSAD 6660 Fiber Formation: Theory and Practice

Spring. 3 credits. Prerequisites: polymer chemistry, college physics, FSAD 4360, 6200, or permission of instructor. S–U or letter grades. Offered alternate years. M. Frey.

Covers the practical and theoretical analysis of the chemical and physical principles of the methods of converting bulk polymer to fiber; rheology; melt, dry, and wet polymer spinning; fiber drawing, heat setting; and general theory applied to unit processes.

FSAD 6700 Fashion Theory

Spring. 3 credits. Limited to 25 students. Prerequisite: FSAD 3460 for undergraduates or similar course for graduates. Letter grades only. Offered alternate years. Minimum cost of materials: \$250. V. D. Lewis.

Provides students with theoretical insights that will enable them to conduct innovative debates and challenge extant creative strategies. The course considers a topical dilemma that students must respond to using conceptual foundations and methodologies that are bound in studio practice, criticism, education, management and the cultural context of fashion design.

[FSAD 6720 Creative Problem-Solving in Apparel Design]

FSAD 6750 Aesthetics and Meaning in World Dress

Spring. 3 credits. Prerequisites: FSAD 1250 or course in history of art, costume history, or other history. S–U or letter grades. Offered alternate years. C. Jirousek.

Examines the aesthetic and social/psychological relationship between body and clothing in the context of various cultures. Students develop a research topic to be presented orally and in a term paper, and they participate in the development of an exhibition.

FSAD 8990 Master's Thesis and Research

Fall or spring. Credit TBA. Prerequisite: permission of graduate committee chair and instructor. S–U or letter grades. Staff.

FSAD 9990 Doctoral Thesis and Research

Fall or spring. Credit TBA. Prerequisite: permission of graduate committee chair and instructor. S–U or letter grades. Staff.

HUMAN DEVELOPMENT

R. Savin-Williams, chair; B. Koslowski, director of graduate studies; E. Wethington, director of undergraduate studies; M. Belmonte, C. Brainerd, M. Casasola, S. Ceci, R. Depue, J. Eckenrode, G. Evans, S. Hamilton, C. Hazan, T. Kushnir, C. Loeckenhoff, B. Lust, J. Mikels, A. Ong, K. Pillemer, V. Reyna, S. Robertson, J. Ross-Bernstein, C. Schelhas-Miller, Q. Wang, W. Williams. Emeritus: J. Brumberg, M. Cochran, H. Ricciuti

HD 1150 Human Development: Infancy and Childhood

Fall or summer. 3 credits. S–U or letter grades. C. Schelhas-Miller.

Introduces students to the basic concepts, theories, and research in human development as they explain prenatal development and development in infancy and childhood. The

focus is on individual development from an interdisciplinary perspective with an emphasis on psychological development, but also drawing from the fields of sociology, history, biology, anthropology, and education.

HD 1160 Section for Infancy and Childhood

Fall or summer. 1 credit. Enrollment in fall limited to HD majors. Enrollment in fall and summer limited to students enrolled in HD 1150. Letter grades only. C. Schelhas-Miller.

Provides an opportunity to discuss material in more depth in a small group. Students learn to read and critique empirical research articles and discuss the application and policy implications of course topics.

HD 1170 Human Development: Adolescence and Emerging Adulthood

Spring. 3 credits. S-U or letter grades. C. Schelhas-Miller.

Broad overview of theories, research, and issues in the study of human development during adolescence and emerging adulthood. Focuses on the major biological, cognitive, and social changes during adolescence; the psychosocial issues of adolescence, including identity, autonomy, intimacy, sexuality, achievement, and problems; and the contexts in which adolescent development occurs, particularly families, peer groups, schools, work, and popular culture. Discusses empirical research, theories, case studies of the lives of real adolescents, and, to a lesser degree, public policies.

HD 1710 The Black Family and the Socialization of Black Children (also ASRC 1600)

Fall. 3 credits. Letter grades only. T. Gosa. For description, see ASRC 1160.

HD 2180 Human Development: Adulthood and Aging

Spring. 3 credits. Prerequisite: HD 1150. S-U or letter grades. C. Loeckenhoff.

General introduction to theories and research in adult development and aging. Discusses psychological, social, and biological changes from youth through late adulthood. Emphasizes both individual development within generations and differences among generations.

[HD 2200 The Human Brain and Mind: Biological Issues in Human Development (also COGST 2200)]

HD 2300 Cognitive Development (also COGST 2300)

Fall. 3 credits. Prerequisite: HD 1150 or PSYCH 1101. T. Kushnir.

Surveys current theory and research on various aspects of cognitive development across the life span, with emphasis on infancy and early childhood. Topics include perception, representation and concepts, reasoning and problem solving, social cognition, memory, metacognition, language and thought, and academic skills. Students develop a broad understanding of the mechanisms, processes, and current issues in cognitive development and learn to critically assess developmental research. The course is a combination of lecture, seminar, and fieldwork.

HD 2380 Thinking and Reasoning (also COGST 2380)

Fall. 3 credits. Prerequisite: HD 1150 or PSYCH 1101. B. Koslowski.

Examines problem solving, transfer, and creativity; pre-causal and causal reasoning; models of good thinking based on formal logic, pragmatic syllogisms, and probability theory; expert-novice differences; cognition and attitudes; extra-rational and magical beliefs; and putative racial and social class differences in intelligence. Two general themes run through the course: (1) the extent to which children and adults approximate the sorts of reasoning that are described by various psychological models; (2) the extent to which various models accurately describe the kind of thinking that actually is required by the problems and issues that arise and must be dealt with in the real world.

HD 2510 Social Gerontology: Aging and the Life Course (also SOC 2510)

Spring. 3 credits. Prerequisites: HD 1150, SOC 1101, DSOC 1101, or PSYCH 1101. S-U or letter grades. E. Wethington.

Analyzes the social aspects of aging in contemporary American society from a life course perspective. Topics include (1) an introduction to the field of gerontology, its history, theories, and research methods; (2) a brief overview of the physiological and psychological changes that accompany aging; (3) an analysis of the contexts (e.g., family, friends, social support, employment, volunteer work) in which individual aging occurs, including differences of gender, ethnicity, and social class; and (4) the influences of society on the aging individual.

HD 2600 Introduction to Personality (also PSYCH 2750)

Fall. 3 credits. Recommended: introductory psychology or human development course. V. Zayas.

Introduction to theory and research in the area of personality psychology, with special emphasis on personality development. Covers the major influences—including genetic, environmental, and gene-environment interactions—and involves in-depth study of the major theories. Examines and compares assumptions and models of human behavior that form the basis of each theoretical orientation, and reviews and evaluates the relevant empirical evidence. In addition, basic psychometric concepts and the methods for measuring and assessing personality are covered, as are the major related debates and controversies.

HD 2610 The Development of Social Behavior

Fall. 3 credits. Highly recommended: HD 1150 or PSYCH 1280. J. Mikels.

Examines issues in the development of social behavior from the perspective of theory and research. Likely topics include bases of social behavior across the life span, the role of parents, siblings, and peers, the development of prosocial and aggressive behavior, the development and functioning of attitude and value systems, moral development, emotional development, and the function and limits of experimental research in the study of social development.

HD 2820 Community Outreach (also PSYCH 2820)

Fall. 2 credits. Prerequisites: HD 1150 or PSYCH 1101. Students may not register concurrently with HD 3270/PSYCH 3270 or 3280. Letter grades only. H. Segal.

For description, see PSYCH 2820.

HD 3110 Educational Psychology (also EDUC 3110)

Fall. 4 credits. S-U or letter grades. D. Schrader.

For description, see EDUC 3110.

HD 3190 Memory and the Law

Fall. 3 credits. Prerequisites: HD 1150 or PSYCH 1101 or HD 2330 or PSYCH 2650. S-U or letter grades. C. Brainerd.

This course will focus on how the scientific study of human memory interfaces with the theory and practice of law. Students will study relevant areas of memory research (e.g., storage, retrieval, false memory, memory deficits in impaired populations) and memory theory. Students will also study specific areas of legal practice in which the reliability of evidence is critically dependent on human memory (e.g., eyewitness identification, recovery of repressed traumatic memories, confessions, elderly witnesses, child witnesses). Readings will come from leading textbooks on these topics and also from primary sources.

[HD 3200 Human Developmental Neuropsychology]

HD 3270 Field Practicum I (also PSYCH 3270)

Fall. 3 credits. Limited to 30 students. Students must commit to taking HD 3280 in spring semester. Prerequisites: HD 3700 or PSYCH 3250 and permission of instructor. Letter grades only. H. Segal.

For description, see PSYCH 3270.

HD 3280 Field Practicum II (also PSYCH 3280)

Spring. 3 credits. Limited to 30 students. Prerequisites: HD 3270/PSYCH 3270 taken previous semester, PSYCH 3250 or HD 3700 and permission of instructor. Letter grades only. H. Segal.

For description, see PSYCH 3280.

HD 3330 Children and the Law

Fall. 3 credits. Prerequisites: HD 1150 and introductory statistics course. S. Ceci.

Examines psychological data and theories that shed light on the practical issues that arise when children enter the legal arena. Attempts to integrate theories, research, and methodology from several areas of psychology, including developmental, cognitive, social, and clinical. Also attempts to examine the degree to which basic research can (and should) be used to solve applied issues. Selected topics include memory development, suggestibility, theory of mind, childhood amnesia, expectancy formation, symbolic representational ability, and finally, what can (or should) an expert witness tell the court. Several actual cases involving child witnesses are presented to illustrate the application of scientific data to the courtroom. Because of the heavy use of case materials and video and textual coverage of actual trials, it is expected that students will devote more than the usual number of hours to this course.

[HD 3340 The Growth of the Mind (also COGST 3340)]

Spring. 4 credits. Recommended: course in human experimental psychology, statistics, or HD 1150 or equivalent, or permission of instructor. S–U or letter grades. Next offered 2010–2011. B. Lust.

Introduces the fundamental issues of cognition. Students are asked to consider several questions. What is the nature of human intelligence? How are knowledge and understanding acquired and represented in the human mind? What is the nature of mental representation? What are the cognitive characteristics of the mind at birth? What is the relation of the acquisition of knowledge and understanding to their final representation? What are the relations between language and thought? In the study of those issues, how can epistemology and experimental psychology be related through the experimental method? Basic debates within the study of cognition are introduced and discussed throughout. The course analyzes Piaget's comprehensive theory of cognitive development and experimental results. Current research in cognitive development is contrasted.]

[HD 3360 Connecting Social, Cognitive, and Emotional Development]**[HD 3370 Language Development (also COGST/PSYCH/LING 3370)]**

Spring. 4 credits. Open to undergraduate and graduate students. Supplemental lab course available (HD 4370, PSYCH 4370, COGST/LING 4500). Graduate students also should enroll in HD 6370/LING 7000, supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, neurobiology, biology, or linguistics. S–U grades optional. Next offered 2010–2011. B. Lust.

Surveys basic issues, methods, and research in the study of first-language acquisition. Considers major theoretical positions in the field in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental issues of relationships between language and thought are discussed, as are the fundamental linguistic issues of "Universal Grammar" and the biological foundations for language acquisition. The acquisition of communication systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child.]

HD 3420 Participation with Groups of Young Children

Fall. 4 credits. Limited to 25 students. Prerequisites: HD 1150 and contact with instructor to arrange placement hours. S–U or letter grades. J. Ross-Bernstein.

Designed to integrate developmental theories with supervised experience in local care and educational contexts for young children, the intention being to enhance the student's abilities to understand and to relate effectively to young children. Students are required to participate six hours per week in a setting with young children. Placements are in local pre-kindergarten and kindergarten programs, day care centers, nursery schools, and Head Start programs.

Note: Six hours of placement per week (completed in two 3-hour blocks of time) are required. For your information: students select

ONE of the following placement options: M W (8–11 or 9–12), M F (8–11 or 9–12), T R (8–11 or 9–12), M F (11–2), T R (11–2). A few late-afternoon placements are available M F (2:30–5:30), T R (2:30–5:30).

HD 3430 Social Worlds of Childhood

Spring. 4 credits. Limited to 25 students. Prerequisite: HD 1150. S–U or letter grades. J. Ross-Bernstein.

This course explores the nature, quality, and impact of relationships of school-age children (ages 5–11) in multiple contexts (e.g. school, home, community). Course work is grounded in ecological theory. Paths of inquiry include (1) who and what play critical roles in children's diverse lives, (2) how are these relationships relevant to school-age children's socialization, and (3) what are the processes by which individuals acquire the knowledge, skills, and character traits that enable them to participate as effective members of groups and society. Study of systems and relationships that impact the child will be organized according to person, process, context, and outcome. Students are required to participate 4 hours per week in a setting with school-age (5–11) children.

HD 3440 Infant Behavior and Development

Fall. 3 credits. Limited to 60 students. Not open to freshmen. Prerequisites: HD 1150, biology course, and statistics course. S. Robertson.

Examines behavior and development from conception through the first two years of life in traditional areas (e.g., perception, cognition, socioemotional theory, language, motor function). Strongly emphasizes the fundamental interconnectedness of these aspects of development as well as their relation to the biology of fetal and infant development. Emphasizes topics with implications for general theories of development (e.g., the functional significance of early behavior, the nature of continuity and change, and the role of the environment in development). Also describes conditions that put infants at risk for poor development (e.g., premature birth, exposure to environmental toxins, maternal depression) and topics with current social, ethical, or political implications (e.g., infant day care, fetal rights). Research methodology in the study of early behavior and development is emphasized throughout the course.

HD 3460 The Role and Meaning of Play

Fall. 3 credits. Limited to 45 students. Prerequisite: junior or senior standing; HD 1150. J. Ross-Bernstein.

Examines the play of children ages three through seven. Through seminar discussions, workshops, videos, and individualized research students explore the meaning and validity of play in the lives of young children, the different ways that children play and the value of each, and the effect of the environment in enhancing and supporting play.

[HD 3470 Human Growth and Development: Biological and Behavioral Interactions (also BSOC 3471, NS 3470)]

Spring. 3 credits. Limited to 150 students. Prerequisites: BIOG 1101 or 1109 or equivalent, and HD 1150 or PSYCH 1101. Offered alternate years; next offered 2010–2011. S. Robertson and J. Haas.

Concerned with the interrelationships of physical and psychological growth and development in humans during infancy. Considers intrinsic and extrinsic causes of variations in growth, including various forms of stimulation. Also examines the consequences of early growth and its variations for current and subsequent behavioral, psychological, and physical development. The interaction between physical and behavioral or psychological factors is emphasized throughout the course.]

HD 3490 Positive Psychology

Fall. 3 credits. Limited to 120 students. Prerequisites: HD 1150 or PSYCH 1010 and HD 2600/PSYCH 2750 or HD 2610 or PSYCH 2800. S–U or letter grades. A. Ong.

This course will take a comprehensive look at current research and theory in the emerging field of Positive Psychology. Students will become familiar with theories, methods, and empirical research pertaining to the psychology of human strengths, virtues, abilities and talents.

HD 3530 Risk and Opportunity Factors in Childhood and Adolescence

Fall. 3 credits. Limited to 100 students. Prerequisites: HD 1150 or 1170. S–U or letter grades. J. Whitlock.

Explores the meaning of risk and opportunity in the lives of children and youth. Begins with a brief history of the social construction of childhood and adolescence and moves into identification of the core concepts associated with risk accumulation and resilience. Uses case studies, large and small group discussion, and policy debates to explore central concepts as they relate to social policy, professional practice, and community development. Assignments include integrative reflection papers on course material, quizzes, and participation in a simulated public policy debate. .

[HD 3570 Social Inequalities in Physical and Mental Health (also SOC 3670)]

Fall. 3 credits. Limited to 120 students. Prerequisites: HD 1150, PSYCH 1010, HD/SOC 2510, DSOC 1010, or SOC 1010. S–U or letter grades. Next offered 2010–2011. E. Wethington.

This course is an introduction to physical and mental health inequalities in the United States, the causes of these inequalities, and their impact on individual development across the life course. Lectures will focus on the relationship between socioeconomic status and rates of physical and mental illness in social groups, exposure to psychosocial stress across the life course, and the protective role of social integration.]

HD 3620 Human Bonding

Spring. 3 credits. Limited to 600 students. Recommended: introductory psychology or human development course. S–U or letter grades. C. Hazan.

Covers the science of interpersonal relationships. Examines the basic nature of human affectional bonds, including their functions and dynamics. Covers such topics as interpersonal attraction and mate selection, intimacy and commitment, love and sex, jealousy and loneliness, the neurobiology of affiliation and attachment, and the role of relationships in physical and psychological health.

HD 3660 Emotional Functions of the Brain

Spring. 3 credits. Prerequisites: HD 2200 or PSYCH 2230/4600 or BIONB 2220. Letter grades only. R. Depue.

The focus of this course concerns networks of brain regions that are organized around the integration of processes related to emotion and motivation. The course first explores brain pathways for processing visual, auditory, body and face movements, and tactile stimuli that comprise the raw material used to judge the emotional significance of external events.

Next, brain regions involved in the (1) emotional evaluation of that sensory input, and (2) emotional expression once a significant event is identified are described. Then, brain processes underlying the special nature of human emotional experience (subjective feelings) are explored. All of these basic emotional processes are extended by placing them within widespread brain networks that modulate emotional behavior. There is an emphasis on social contexts and the development of social emotions, including social bonding and social rejection. The manner in which emotional stress influences learning and memory, with implications for PTSD, concludes the course.

HD 3700 Adult Psychopathology (also PSYCH 3250)

Spring. 3 credits. Prerequisites: sophomore, junior, or senior standing; any course in psychology or human development. H. Segal.

For description see PSYCH 3250.

HD 3820 Research Methods in Human Development

Spring. 3 credits. Prerequisite: HD 1150. Highly recommended: background in statistics. Letter grades only. M. Casasola.

Students learn about a variety of research methodologies and gain firsthand experience in conducting all aspects of a research project. Students design and conduct one descriptive and one experimental study. They also gain experience in using statistical software to analyze data.

HD 3840 Gender and Sexual Minorities (also FGSS 3850)

Fall. 3 credits. Prerequisite: social science course. S-U or letter grades. K. Cohen.

Introduces students to theories, empirical scholarship, and current controversies regarding lesbian, gay, bisexual, transgender, sexually questioning, and other gender and sexual minority populations. The major focus is on sexual development, lifestyles, and communities with additional coverage of ethnic, racial, and gender issues. Videos supplement readings and lectures.

HD 4000-4010-4020-4030 Special Studies for Undergraduates

Fall or spring. Credit TBA; 1-4.

Prerequisite: permission of instructor. S-U or letter grades.

For advanced independent study by an individual student or for study with a group of students in a field of HD not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multicopy description of the study they want to undertake, on a form available from the department office in G77 MVR. This form must be signed by the instructor directing the study and the student's faculty advisor and submitted to G77 MVR, the Office of Undergraduate Education. After the

form is approved, the student takes it to the college registrar's office, 146 MVR. To ensure review before the close of the periods, early submission of the special studies form to the Office of Undergraduate Education is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

4000: Directed Readings. Prerequisite: permission of instructor. For study that predominantly involves library research and independent study.

4010: Empirical Research. Prerequisite: permission of instructor. For study that predominantly involves data collection and analysis, or laboratory or studio projects.

4020: Supervised Fieldwork. Prerequisite: permission of instructor. For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

4030: Teaching Assistantship. Prerequisites: permission of instructor; juniors and seniors with minimum 3.0 GPA; either HD 1150, or PSYCH 1101, and two intermediate-level HD courses, or equivalent courses in psychology or sociology. Students must have taken course and received B+ or higher. For study that includes assisting faculty with instruction.

[HD 4140 Social and Psychological Aspects of the Death Penalty

Spring. 3 credits. Limited to 20 students.

Prerequisites: junior or senior standing and HD 1150 and HD 2330 or PSYCH 2650. S-U or letter grades. Next offered 2010-2011. C. Brainerd.

This course will focus on how the field of human development contributes to death penalty cases through the creation of social history reports on death-qualified defendants and will provide training in how to prepare such reports. Students will study relevant areas of death penalty law (e.g., *Wiggins v. Smith*, mitigation law, pre- vs. post-conviction). Students will also study specific areas of human development research that figure centrally in social history reports (e.g., intelligence testing, educational disability, mental illness and the DMS-IV, social and family environment, prediction of future dangerousness, anti-social personality.)

[HD 4180 Aging: Contemporary Issues

Spring. 3 credits. Limited to 20 students.

Prerequisites: junior or senior standing; HD 2180, 2500, or 2510 or permission of instructor. Letter grades only. Next offered 2010-2011. J. Mikels.

Seminar addressing major issues and controversies in the field of aging. Designed for upper-level students who wish to pursue an in-depth analysis of concepts such as "successful" aging and wisdom. Although these issues are addressed primarily from a psychological viewpoint, interdisciplinary perspectives are considered and incorporated in both readings and discussions. Designed for advanced undergraduates who have completed an introductory course in adulthood and aging and wish to pursue such issues in more depth. Class time is devoted primarily to discussion of assigned readings.]

[HD 4190 Midlife Development

Fall. 3 credits. Limited to 20 students.

Prerequisites: junior or senior standing; HD 2180, 2500, or 2510 or permission of instructor. Letter grades only. Offered alternate years; next offered 2010-2011.

A. Ong.

This seminar-style course examines the burgeoning research literature on adult development during midlife. Focuses on research and theory examining psychological changes during middle adulthood such as relativistic and dialectical thinking, personality, identity, and sense of control. Also considers the social and physical changes that occur at this time of life especially regarding issues such as empty nest anxieties, divorce, career transitions, menopause, and cardiovascular disease. Oral presentations, class participation, and an integrative paper are required.]

HD 4200 Risk and Rational Decision Making

Spring. 3 credits. Limited to 20 students.

Prerequisites: junior or senior standing and HD 1150 and HD 2330 or PSYCH 2650 or PSYCH 2800. S-U or letter grades.

V. Reyna.

This course will offer a hands-on introduction to research and laboratory techniques that address topics in risk and rational decision making in human development from multiple disciplinary perspectives. The course will include activities such as scientific presentations, collaborative work, peer review, and designing research on topics in decision-making under risk and uncertainty, as well as discussion of scientific methods and interpretation of data. Topics in decision-making may include war, terrorism, cancer control and prevention (e.g., screening tests), personal behaviors that involve risk (e.g., HIV-prevention), and other public health risks (e.g., vaccinations), law enforcement (e.g., use of a weapon) and legal decision-making (e.g., jury deliberations).

HD 4220 Research in Emotion and Cognition

Fall. 4 credits. Limited to 20 students.

Prerequisites: HD 1150 or PSYCH 1101 AND HD 2610 or HD 2600; permission of instructor. J. Mikels.

The course focuses on age-related changes in emotion and cognition. Research indicates that while cognitive processes decline, emotional processes remain intact in later life. Moreover, evidence indicates that the goals of older adults differ from those of younger adults, which have critical implications for changes in cognitive and emotional processes with age. The ongoing research in the Emotion and Cognition Laboratory examines these relationships. In this research course, undergraduate students attend a weekly lab meeting for 1.25 hours per week, read pertinent papers, write reaction responses, and work in the lab completing various tasks for 10.75 hours.

[HD 4230 Research in Children's Testimony: Exploring Social and Cognitive Mechanisms

Fall. 4 credits. Limited to 20 students.

Prerequisites: HD 1150 or PSYCH 1101 AND an introductory course in statistics, and permission of instructor. Next offered 2010-2011. S. Ceci.

HD 4230 is a laboratory-based research that exposes students to the research process in the area of children's testimonial competence.

This means going from theory to empirical reports and participating in the generation of new hypotheses and methods of falsifying them. Theoretical arguments, grounded in empirical findings, suggest children are vulnerable to a host of reliability risks when they are interviewed or give testimony. Various social (e.g., stereotypes, reinforcement, parental attachment, peer pressure) and cognitive (trace strength, source misattributions) mechanisms are responsible for these risks, and students will have a ringside seat at their examination. In this course, up to 20 undergraduate students will attend a weekly lab meeting for 1.5 hours per week, read assigned research articles, post questions on Blackboard that can lead to follow-up studies, and work 10.5 hours per week in the laboratory completing tasks that contribute to ongoing research studies conducted by the professor and his graduate students.]

HD 4240 Stress, Emotions, and Health

Fall. 4 credits. Limited to 20 students.
Prerequisites: HD 1150 or PSYCH 1101 AND HD 2610 or HD 2600 and permission of instructor. A. Ong.

The course will review theory and research on stress, emotions, and health. This course will offer opportunities for students to develop new ways to integrate theory and research on stress and health with the advances in the science of affect and emotion. In this course, undergraduate students attend a weekly lab meeting for 1.25 hours per week, read pertinent papers, write reaction responses, and work 10.75 hours per week in the laboratory completing tasks that contribute to ongoing research studies.

HD 4250 Translational Research on Decision Making

Fall. 4 credits. Limited to 20 students.
Prerequisites: HD 1150 or PSYCH 1101 AND HD 2610 or HD 2600. V. Reyna.

A laboratory-based course focusing on basic foundations in translational research on decision making across the lifespan. The course will introduce students to hands-on applications of research skills in the context of research on decision making, spanning basic and applied research in law, medicine, behavioral economics, and policy. This introductory course will focus on such topics as human subjects protection, working with populations across the life span (e.g., children; seniors), database development, working with external partners and stakeholders (e.g., schools; hospitals), and basic concepts and techniques in decision research. Students in this basic course will participate in weekly laboratory meetings in small teams focused on specific projects as well as monthly meetings in which all teams participate. During laboratory meetings, we discuss ongoing research, plans for new studies, and interpretations of empirical findings from studies that are in progress or have been recently completed. New students work closely with experienced students eventually working more independently. In order to fully grasp how the research projects fit into the broader field, students will read relevant papers weekly and write reaction responses. Because several projects are ongoing at all times, students have the opportunity to be involved in more than one study and will be assigned multiple tasks such as piloting research paradigms, subject recruitment, data collection, data analysis, and data entry. Students attend a weekly lab

meeting for 1.5 hours per week, read pertinent papers, write reaction responses, and work 10.5 hours per week in the laboratory completing tasks that contribute to ongoing research studies.

HD 4260 Translational Research on Memory and Neuroscience

Spring. 4 credits. Limited to 20 students.
Prerequisite: HD 1150 or PSYCH 1101 AND HD 2610 or HD 2600. C. Brainerd.

HD 4260 is a laboratory-based course focusing on basic foundations in translational research on the neuroscience of human memory and memory development. The course will introduce students to hands-on applications of research skills in the context of research on memory and neuroscience, spanning basic and applied research in law and medicine. In this course, undergraduate students attend a weekly lab meeting for 1.75 hours per week, read pertinent papers, write reaction responses, and work 10.25 hours per week in the laboratory completing tasks that contribute to ongoing research studies.

HD 4310 Mind, Self, and Emotion: Research Seminar

Spring. 3 credits. Limited to 20 students.
Prerequisites: upper-class undergraduate or graduate standing; HD 1150 or PSYCH 1010. Letter grades only. Offered alternate years. Q. Wang.

This research seminar is offered to students who are currently conducting research or planning to do research in the near future on one of the three topics—memory, self, or emotion. We examine current data and theories concerning the topics from a variety of perspectives and at multiple levels of analysis, particularly focusing on the interconnections among these fields of inquiry. The “scale of observation” is viewed as occurring within the person (brain mechanisms, including genetics), at the level of the person (content-goals, beliefs, desires, etc.), and between persons (relationships and group interaction—including culture).

[HD 4320 Cognitive, Social, and Developmental Aspects of Scientific Reasoning (also COGST 4320)]

Spring. 3 credits. Limited to 20 students (14 HD 4320, 6 COGST 4320). Prerequisites: junior or senior standing; HD 1150 or PSYCH 1010 or permission of instructor. S–U or letter grades. Next offered 2010–2011. B. Koslowski.

The basic premise of this course is that scientific reasoning is not restricted to scientists but is continuous with good reasoning in general. We will examine not only how people reason, but also the extent to which their reasoning is either flawed or appropriate. The seminar will discuss issues related to how we identify the causes of phenomena, especially in situations in which we cannot conduct an experiment; the limits of covariation data and how it interacts with information about theory; generating, evaluating, and deciding between competing explanations; dealing with anomalous or inconsistent data; confirmation bias and disconfirmation; the role of theory and culturally available information in generating and evaluating alternative hypotheses; and whether age and cultural differences in reasoning result from different reasoning strategies or from differences in the sorts of background information that are available and the different explanations that are treated as legitimate.]

[HD 4330 Developmental Cognitive Neuroscience]

Spring. 3 credits. Limited to 20 students.
Prerequisites: junior or senior standing; HD 2200 or PSYCH 2230, BIONB 2220. S–U or letter grades. Offered alternate years; next offered 2010–2011. Staff.

What are the brain mechanisms underlying human behavior and cognition? How do those underlying brain mechanisms develop? These are the questions that developmental cognitive neuroscience tries to address and those explored in this course. The course explores methods used in the field (including brain imaging techniques), recent findings on the development of brain mechanisms underlying human behaviors such as language, attention, and memory, as well as the brain mechanisms that may underlie various developmental disorders such as developmental dyslexia, autism, and attention deficit (hyperactive) disorder (AD/HD). Emphasis is on reading primary research literature and acquiring the skills to understand, critique, discuss, and write about primary research. The format includes lecture and discussion.]

[HD 4340 Current Topics in Cognitive Development]

Spring. 3 credits. Limited to 20 students.
Prerequisites: HD/COGST 3340 or permission of instructor. S–U or letter grades. Next offered 2010–2011. B. Lust.

This course will supplement survey course HD/COGST 3340 with additional discussion of current research in the area of cognitive development. Selected current papers that debate issues discussed in HD/COGST 3340 will be read and discussed in parallel with the HD/COGST 3340 survey course. Modern interpretations and challenges to Piaget's theory will be evaluated in light of current literature in the field. A small-group format will be adopted to encourage discussion.]

[HD 4370 Lab Course: Language Development (also COGST/LING 4500, PSYCH 4370)]

Fall. 4 credits. Limited to 20 students.
Prerequisite: HD/COGST/PSYCH/LING 3370 or equivalent. Next offered 2010–2011. B. Lust.

Optional supplement to the survey course Language Development (COGST/HD/LING/PSYCH 3370). The lab course provides students with a hands-on introduction to scientific research, including design and methods, in the area of first-language acquisition.]

HD 4440 Internship in Educational Settings for Children

Fall or spring. 8–12 credits. Prerequisites: HD 1150, 3420 or 3430, and 3480; permission of instructor. Recommended: HD 3460. S–U or letter grades. J. Ross-Bernstein.

Offers an opportunity to integrate theory with practice at an advanced level and to further develop understanding of children ages 2 to 10 and their families. Interns function as participants in varied settings and participate in curriculum planning, evaluation, staff meetings, home visits, parent conferences, and parent meetings. Supervision by head teacher and instructor. Students are expected to define their own goals and to assess their progress, to do assigned and self-directed readings, and to keep a critical incident journal.

HD 4480 Advanced Participation with Children

Spring. 4-8 credits. Limited to 20 students (depending on availability of placements and supervision). Prerequisites: HD 1150 and 3420 or 3430 and permission of instructor. Recommended: HD 3460. S-U or letter grades. J. Ross-Bernstein.

Supervised field-based course designed to help students deepen and consolidate their understanding of children. Students are expected to define their own goals and assess progress with supervising teachers and the instructor; to keep a journal; and to plan, carry out, and evaluate weekly activities for children within their placement. Conference groups and readings focus on the contexts of development and on ways to support children's personal and interpersonal learning. Each student is expected to do a presentation and paper on a self-selected topic within the scope of the course. Participation is in settings that serve typical and/or special needs children from three to eight years of age and provide education, care, or special-purpose interventions for them.

HD 4520 Culture and Human Development (also COGST 4520)

Spring. 3 credits. Limited to 20 students. Prerequisite: HD 1150 or PSYCH 1010. Open to undergraduate and graduate students. Letter grades only. Offered alternate years. Q. Wang.

This seminar takes an interdisciplinary approach to address the central role of culture in human development. It draws on diverse theoretical perspectives, including psychology, anthropology, education, ethnography, and linguistics, to understand human difference, experience, and complexity. It takes empirical reflections upon major developmental topics such as cultural aspects of physical growth and development; culture and cognition; culture and language; culture, self, and personality; cultural construction of emotion; culture issues of sex and gender; and cultural differences in pathology.

HD 4570 Health and Social Behavior (also SOC 4570)

Fall. 3 credits. Limited to 20 students. Prerequisites: junior or senior standing; statistics course and *one* of the following: HD 2500, SOC/DSOC 1101, or HD/SOC 2510. Letter grades only. Offered alternate years. E. Wethington.

Critically examines theories and empirical research on the relationships among social group membership, social status, and physical and mental health. Lectures focus on social stress, social support, and socioeconomic status, all of which are associated with variations in physical health, mental health, and health maintenance behaviors. Students are expected to read widely from current literature in medical sociology, health psychology, public health, and epidemiology.

HD 4590 Transitions Across the Life Span

Fall. 3 credits. Prerequisites: Senior or Junior standing, HD 3180, HD 2510, or instructor permission. Enrollment limited to 20 students. C. Loeckenhoff.

This seminar-style class will focus on some of the major normative and non-normative transitions that people encounter from late adolescence to advanced old age. Based on the contemporary research literature, we will identify common factors including personality traits, coping strategies, social support, and

environmental context that influence successful mastery of such transitions.

[HD 4640 Adolescent Sexuality (also FGSS 4670)]**[HD 4660 Psychobiology of Temperament and Personality]**

Fall. 3 credits. Limited to 20 students. Prerequisite: HD 3660 and permission of instructor. Next offered 2010-2011. Letter grades only. R. Depue.

This course has a seminar format and is oriented to students planning to enter either a Ph.D. program in biological aspects of psychology or an M.D. program. It relies on basic research literature that requires detailed studying. The development of neurobehavioral systems as a means of adapting to critical stimuli has formed the basis of emotional systems in humans, and individual differences in these systems form the basis of temperament and personality. The nature of temperament and personality is explored from psychometric, experiential, genetic, and neurobiological points of view. There is a focus on the general role played by the biogenic amines (dopamine, norepinephrine, and serotonin), neuropeptides (corticotrophin releasing hormone, opiates, oxytocin), genetic polymorphisms in these neuromodulators, and early experience in determining individual differences in temperament and personality. The manner in which these biological factors influence the encoding of experience is explored as the basis of stability in personality traits.]

HD 4680 Stress in Childhood and Adolescence

Spring. 3 credits. Limited to 20 students. Prerequisite: junior or senior standing. Recommended: HD 1150 and a statistics course. Letter grades only. J. Eckenrode.

Advanced seminar that reviews research related to the nature and consequences of stressful experiences in childhood and adolescence, particularly those arising in the family. Topics represent common stressors in the lives of children (e.g., divorce of parents) that have potentially damaging consequences for development. Also covers topics in which Cornell faculty members have conducted significant research (e.g., child abuse and neglect). In addition to considering the negative effect of stress on development, also considers issues of individual differences in stress reactivity, including the concepts of coping and resilience. These topics lead naturally into discussions of practice and policy.

HD 4740 Autism and the Development of Social Cognition

Fall. 3 credits. Limited to 20 seniors and juniors. Prerequisites: one statistics course AND either BIONB 2220 OR one course in neuroscience numbered 3000 or above (e.g., HD 3660 or PSYCH 3320 or 4250). S-U or letter grades. M. Belmonte.

What drives the development of social cognitive skills such as language, theory of mind, and empathy? To what extent do these capacities constitute isolable "modules," or how might they emerge from more elementary neural properties? How can understanding what goes wrong during autistic development teach us about what goes right during normal development, and about how neural and cognitive development intertwine? This seminar covers current psychological and neurobiological theories of autism, emphasizing written analysis and critical

review of the primary research literature. Specific topics will be selected to match students' interests, and each student will develop and orally defend a research proposal on an open question in the neuroscience of autism or related developmental disorders.

HD 4780 Attention Deficit/Hyperactivity Disorder in Children

Spring. 3 credits. Limited to 15 students. Prerequisites: HD 1150 or equivalent, introductory biology, statistics course. S-U or letter grades. S. Robertson.

This seminar examines in detail the nature, diagnosis, epidemiology, causes, and treatment of ADHD through a critical evaluation of the recent scientific and medical literature. Also considers implications for families, schools, and society.

HD 4980 Senior Honors Seminar

Fall and spring. 1 credit. Requirement for and limited to seniors in HD honors program. S-U grades only. M. Casasola. In this weekly seminar, students are guided through the process of completing an honors thesis in human development. The course focuses on developing students' writing abilities, reviewing statistics and how to present research findings in a manuscript, and receiving feedback on drafts of their thesis, as well as practice presenting the results of their thesis in poster and oral presentations.

HD 4990 Senior Honors Thesis

Fall or spring. Credit TBA. Prerequisite: permission of thesis advisor and coordinator of honors program. S-U or letter grades. HD faculty.

The Graduate Program

HD graduate courses are open to undergraduates only by permission of instructor.

General Courses**HD 6020 Research in Risk and Rational Decision Making**

Spring. 3 credits. Limited to 5 students. Corequisite: HD 4200. S-U or letter grades. V. Reyna.

This hands-on laboratory course will inculcate research skills in the context of risk and rational decision making in human development from multiple disciplinary perspectives and with respect to different kinds of decision-making under risk and uncertainty. Such decisions concern war, terrorism, cancer control and prevention (e.g., screening tests), personal behaviors that involve risk (e.g., HIV-prevention), and other public health risks (e.g., vaccinations), law enforcement (e.g., use of a weapon), and legal decision-making (e.g., jury deliberations). Students will read the research literature, and discuss the latest empirical findings and scientific theories of risk and rationality, engaging in group work and peer review to hone their skills. Students will then design research projects based on that 6520 Translational Research on Aging material as well as additional references tailored to their interests.

HD 6110 Psychology of Emotion

Spring. 3 credits. J. Mikels and A. Ong. This course will take a comprehensive look at current research and theory in the field of emotion. Students will become familiar with theories, methods, and empirical research pertaining to the psychology of emotions. Topics covered will include—but are not

limited to—theoretical models of emotion, emotion antecedents, emotional responses (facial, subjective, and physiological), functions of emotion, emotion regulation, individual differences, and health implications.

[HD 6140 Social and Psychological Aspects of the Death Penalty]

Spring. 3 credits. Limited to 5 students. Prerequisite: Cornell doctoral students. S–U or letter grades. Next offered 2010–2011. C. Brainerd.

This course will focus on how the field of human development contributes to death penalty cases through the creation of social history reports on death-qualified defendants and will provide training in how to prepare such reports. Students will study relevant areas of death penalty law (e.g., *Wiggins v. Smith*, mitigation law, pre- vs. post-conviction) and design relevant research. Students will also study specific areas of human development research that figure centrally in social history reports (e.g., intelligence testing, educational disability, mental illness and the DMS-IV, social and family environment, prediction of future dangerousness, anti-social personality.)

HD 6190 Memory and the Law

Fall. 3 credits. Limited to 5 doctoral students. S–U or letter grades. C. Brainerd. This course will focus on how the scientific study of human memory interfaces with the theory and practice of law. Students will study relevant areas of memory research (e.g., storage, retrieval, false memory, memory deficits in impaired populations) and memory theory. Students will also study specific areas of legal practice in which the reliability of evidence is critically dependent on human memory (e.g., eyewitness identification, recovery of repressed traumatic memories, confessions, elderly witnesses, child witnesses). Readings will come from primary library sources.

HD 6200 First-Year Proseminar in Human Development

Yearlong. 1 credit. Prerequisite: first-year HD graduate students. S–U grades only. B. Koslowski.

Designed as an orientation to the department and the university. Activities include attendance at research presentations, visits to departmental research laboratories, relevant informational sessions (e.g., University Committee on Human Subjects, College Grants), and guidance in preparing a public research presentation to be made at the end of spring semester.

[HD 6210 Seminar on Autobiographical Memory]

Fall. 3 credits. Prerequisites: graduate standing; seniors by permission of instructor. Letter grades only. Next offered 2010–2011. Q. Wang.

This graduate seminar is designed to give an overview as well as in-depth analysis of topics related to autobiographical memory and its development. Readings focus heavily on current theories and empirical research on a wide range of topics including childhood amnesia, reminiscence bump, emotion and memory, memory accuracy, development and disruption, neurological perspectives, memory functions, and memory across cultures.]

[HD 6310 Proseminar on Cognitive Development]

[HD 6320 Cognitive Neuroscience Seminar: Applications of Brain Science to Behavioral Research]

HD 6330 Language Acquisition Seminar (also COGST/LING 6330)

Fall. 1–4 credits. Prerequisite: 3370 or equivalent or permission of instructor. S–U or letter grades. B. Lust.

This seminar reviews and critiques current theoretical and experimental studies of first language acquisition, with a concentration on insights gained by cross-linguistic study of this area. Attention is also given to the development of research proposals.

[HD 6340 Judgment, Decision Making, and Scientific Reasoning]

(HD 6360 Connecting Social, Cognitive, and Emotional Development)

Fall. 3 credits. S–U or letter grades. Next offered 2010–2011. M. Casasola.

Opportunity for graduate students to explore several current areas of research from both a cognitive and a social-emotional perspective. Although the traditional approach to the study of development has centered on studying cognitive development as separate from social and emotional development, the current course focuses on how cognitive and socio-emotional development are integrated and how each influences the development of the other. Thus the course is intended to provide a more integrated view of development. As one example, language acquisition, which traditionally has been viewed as a cognitive achievement, depends not only on social interactions but also on achievement in social understanding and awareness. Likewise, acquiring language that describes emotional states plays an important role in developing children's understanding of others' emotional states. Topics are determined by the interests of the graduate students who enroll.]

[HD 6370 First-Language Acquisition]

HD 6400 Infancy

Spring. 3 credits. S. Robertson.

Examines development in infancy through a critical review of key research and theory in selected aspects of neurobehavior, perception, cognition, language, emotion, and social relationships. Theoretical issues considered include the role of experiences in early development, sensitive periods, continuity and discontinuity in development, and the functional significance of early behavior. Some of the conditions that put infants at risk for poor development are also considered, such as premature birth, perinatal medical complications, and exposure to environmental toxins. Combines perspectives from developmental psychology and psychobiology.

HD 6510 Interdisciplinary Community-Based Scientific Research in Health Disparities

Spring. 2 credits. Prerequisite: for Cornell graduate students, two semesters of graduate-level statistics. S–U or letter grades. E. Wethington.

This course introduces doctoral students to the principles and practices of community-based participatory research (CBPR) on health disparities. The course consists of a series of expert presentations from researchers and practitioners involved in community based research projects in New York City. Individual

seminar topics will range from theoretical models of different models of CBPR and other types of translational research models, methodological education, ethical issues in community-based research, specific community research projects, and funding and publication issues. A primary emphasis is on exposure to interdisciplinary activities, diverse perspectives, and values provided by researcher and community-practice presenters.

HD 6520 Translational Research on Aging Research Seminar

Fall and Spring. 1 credit. Ph.D. students or permission of instructor. S–U or letter grades. K. Pillemer, M. S. Lachs, E. Wethington, and M. C. Reid.

This course introduces Ph.D. students to multidisciplinary research, proposal development, and journal article development in the area of aging and health. The course is organized as a work-in-progress seminar, video-conferenced between the Ithaca campus and Weill Cornell Medical College. At each monthly video-conference, participants discuss two or three works in progress, including grant proposals, funding opportunities, and papers about to be submitted. Participants are expected to have read the papers and proposals beforehand and each attendee is required to comment on each work.

[HD 6600 Social Development]

HD 6740 Autism Spectrum Conditions

Spring. 3 credits. Limited to 25 students. Prerequisites: graduate students in doctoral program; master's students or undergraduates doing research may apply but will be accepted only if actively involved in their own research program. S–U or letter grades. M. Belmonte.

This graduate seminar emphasizes research methodologies and the development of research proposals addressing the neuroscience of autism and other neurobiologically based developmental disorders. Topics will be selected on the basis of students' research objectives and on the basis of the experimental methods used to achieve these objectives. Techniques discussed may include functional magnetic resonance imaging, MRI morphometry, quantitative electroencephalography and event-related potentials, behavior and psychophysics, computational modeling, and diagnostic and psychometric testing. The course will commence with a discussion of participants' research interests and topics, and an overview of diagnostic criteria and other symptoms of autism spectrum conditions. Subsequent sessions will cover the Autism Diagnostic Interview–Revised, the Autism Diagnostic Observation Schedule–Generic, and the Broader Phenotype Autism Symptom Scale. Subsequent discussions will provide an overview of experimental design and anatomical and physiological measurement techniques applicable to human cognitive neuroscience, including MRI, fMRI, PET, EEG, and MEG.

[HD 6860 Graduate Seminar in Research Methods]

HD 6870 Issues in Professional Development

Fall. 3 credits. Prerequisite: at least one semester of graduate-level course work. S–U or letter grades. S. Ceci.

The goal of this seminar is to provide graduate students with essential information

about professional activities that are related to careers in the academy, such as publishing in journals, applying for grants, ethical dilemmas in teaching and research, human subjects issues, academic job search issues, career milestones and evaluations, nonacademic positions, values and mores of the professoriate.

HD 6910 Poverty, the Life Course, and Public Policy (also DEA 6910)

Fall. 3 credits. Limited to 15 students. Prerequisite: graduate standing. Letter grades only. G. Evans.

For description, see DEA 6910.

[HD 6920 Seminar in Translational Developmental Science]

Individualized Special Instruction

HD 7000-8060 Special Studies for Graduate Students

Fall or spring. Credit TBA; 1-15 (3 hours work per week per credit). S-U grades at discretion of instructor. Independent advanced work by graduate students recommended by their Special Committee chair with permission of the instructor.

HD 7000: Directed Readings. For study that predominantly involves library research and independent study.

HD 7010: Empirical Research. For study that predominantly involves collection and analysis of research data.

HD 7020: Practicum. For study that predominantly involves field experience in community settings.

HD 7030: Teaching Assistantship. For students assisting faculty with instruction. Does not apply to work for which students receive financial compensation.

HD 7040: Research Assistantship. For students assisting faculty with research. Does not apply to work for which students receive financial compensation.

HD 7050: Extension Assistantship. For students assisting faculty with extension activities. Does not apply to work for which students receive financial compensation.

HD 7060: Supervised Teaching. 4 credits. For advanced students who assume major responsibility for teaching a course. Supervision by a faculty member is required.

HD 8060: Teaching Practicum. 4 credits. For advanced graduate students independently to develop and teach an undergraduate topics course under the supervision of a faculty member.

HD 8990 Master's Thesis and Research
Fall or spring. Credit TBA; 1-15 (3 hours work per week per credit). Prerequisite: permission of thesis advisor. S-U grades only.

HD 9990 Doctoral Thesis and Research
Fall or spring. Credit TBA; 1-15 (3 hours work per week per credit). Prerequisite: permission of thesis advisor. S-U grades only.

POLICY ANALYSIS AND MANAGEMENT

R. Avery, chair (119A MVR, 255-2578); T. Evans, director of undergraduate studies; D. Kenkel, director of graduate studies; W. White, director of Sloan Program; B. Hollis, executive director of Sloan Program; Faculty: R. Burkhauser, J. Cawley, R. Dunifon, R. Geddes, J. Gerner, J. Glass, J. Kuder, D. Lichter, C. Lucarelli, A. Mathios, J. Matsudaira, K. Musick, S. Nicholson, E. Owens, A. Parrot, E. Peters, P. Pollak, S. Sassler, K. Simon, S. Tennyson, W. Trochim, M. Waller. Emeritus faculty: J. Allen, J. Ziegler. Lecturers: H. Allen, N. Fabrizio, J. Lewis, D. Perosio, W. Schlesinger, M. Weidner.

PAM 2000 Intermediate Microeconomics

Fall or spring. 4 credits. Prerequisite: ECON 1110 or equivalent. Students must enroll in a sec. J. Cawley, T. Evans, and staff.

Topics include theory of demand and consumer behavior including classical and indifference curve analyses; theories of production and cost; models for the following markets—competitive, monopoly, monopolistic competition, oligopoly, and inputs; general equilibrium; welfare economics; public goods; and risk.

PAM 2030 Population and Public Policy

Fall. 3 credits. D. Lichter.

Examines from a demographic perspective family policies that concern children and adults. Toward this end, it considers the relationships between family policies and demographic behavior. It also addresses the effects of family policies and demographic behavior on the well-being of children. Although this course focuses on the United States, it considers U.S. trends against the backdrop of changes in other industrialized countries.

PAM 2040 Economics of the Public Sector

Fall or spring. 3 credits. Prerequisite: PAM 2000. S-U or letter grades. E. Owens, J. Lewis, and staff.

The public sector now spends nearly two out of every five dollars generated as income in the U.S. economy. A thorough knowledge and understanding of this important sector is an essential part of training in policy analysis and management. This course provides an overview of the public sector of the U.S. economy, the major categories of public expenditures, and the main methods used to finance these expenditures. The principles of tax analysis and cost-benefit analysis are presented with a focus on the role of public policy in improving economic efficiency, promoting the goals of equity and social justice, and improving equity by altering the distribution of wealth and income.

PAM 2100 Introduction to Statistics

Fall or spring. 4 credits. J. Lewis, T. Evans, and staff.

Introduces students to descriptive and inferential statistics. Topics include hypothesis testing, analysis of variance, and multiple regression. To illustrate these topics, this course examines applications of these methods in studies of child and family policy.

PAM 2150 Research Design, Practice, and Policy (also SOC 2130)

Spring. 3 credits. Prerequisite: PAM 2100 or equivalent. K. Musick.

This course examines systematic approaches for addressing questions about poverty, family life, racial inequality, and a range of other

issues central to public policy. It emphasizes the logic and methods of social science research, including the measurement of social phenomena, generalizing results to groups of interest, establishing cause and effect, social experiments, survey research, and qualitative methods. It develops skills to critically evaluate the research of others and provides hands-on experience applying research methods to policy-related problems.

[PAM 2220 Controversies about Inequality (also PHIL 1920, DSOC/GOVT/ILROB/SOC 2220)]

Spring. 1-4 credits. Next offered 2010-2011. S. Morgan.]

PAM 2300 Introduction to Policy Analysis

Fall or spring. 4 credits. Fall: R. Avery; spring: J. Gerner.

Policy analysis is an interdisciplinary field that uses theories, concepts, and methods from disciplines such as economics, sociology, and political science to address substantive issues in the public policy arena. Students are introduced to the functions of and interactions between the major institutions (public and private) at the national, state, and local level involved in the policy making process. The course focuses on public policy analysis in the family/social welfare, health, and market regulatory areas and also includes an introduction to the technical skills required to undertake policy analysis.

PAM 2350 The U.S. Health Care System

Spring. 3 credits. S. Nicholson.

Introduction to the U.S. health care system. Covers the interrelatedness of health services, the financing of health care, and the key stakeholders in health care delivery, including regulators, physicians, hospitals, health plans, employers, the pharmaceutical/biotech and medical device industries, and consumers. Describes the history and organization of health care, behavioral models of utilization, issues of health care reform, and current trends. Provides an overview of key policy issues, including the uninsured, the rising cost of medical care, the value of medical care, and inadequate or variable quality of care.

PAM 3100 Multiple Regression Analysis

Fall and spring. 4 credits. Prerequisites: PAM 2100, AEM/ILRST 2100 or equivalent. Sec meets once a week. M. Lovenheim and staff.

Introduces basic econometric principles and the use of statistical procedures in empirical studies of economic models. Discusses assumptions, properties, and problems encountered in the use of multiple regression procedures. Students are required to specify, estimate, and report the results of an empirical model.

PAM 3240 Risk Management and Policy

Fall. 3 credits. Prerequisite: ECON 1110 and statistics course. S. Tennyson.

Provides students with a broad understanding of risk management problems and solutions, a greater appreciation of the importance of risk and risk regulation in our society, and increased comprehension of the complexities of making decisions about risk. Topics include alternative ways to define and measure risk, the importance of risk-tradeoffs, and models of decision making under risk. With this background, alternative approaches to risk management are analyzed. The impact on risk management of the legal liability system and government programs, laws, and policies is also considered.

PAM 3300 Intermediate Policy Analysis

Fall or spring. 3 credits. Prerequisites: PAM 2300, PAM 2100, PAM 3100. J. Matsudaira and staff.

This course examines evaluation methods used to judge whether public policies and programs are effective in achieving their goals. Policy makers are barraged with information about the likely effects of various policy changes, and need to be adept at identifying credible evidence. Building on concepts covered in introductory courses in policy analysis, economics, and statistics, this course will aid students in becoming critical consumers of policy research and evaluations. Examples from a variety of policy areas, including education, welfare, and economic development will be explored.

[PAM 3340 Corporations, Shareholders, and Policy]

Fall. 3 credits. Prerequisite: ECON 1110, PAM 2000 and 2100. S–U or letter grades. Next offered 2010–2011. R. Geddes.]

[PAM 3350 Families, Poverty, and Public Policy]**PAM 3360 Evolving Families: Challenges to Public Policy (also SOC 3360)**

Spring. 3 credits. S. Sassler.

This course examines the social institution of the family, challenges to the institution's well-being and stability, and the role of public policy in these transformations. Topics include family structure and responsibilities; marriage as a traditional building block of the family and challenges to the institution of marriage, including divorce, nonmarital childbearing, cohabitation, and same-sex unions; children, and the impact of family change on their well-being, including the effects of child poverty, maternal employment, and paternal involvement. The role of public policy in managing and shaping these developments will be discussed.

PAM 3370 Race and Public Policy (also SOC 3370)

Spring. 3 credits. S. Sassler.

This course provides an overview of perspectives used in sociological studies of race and ethnicity. We will read classic and contemporary research on racial and ethnic relations in the United States. The first part of the course covers a variety of theories on race/ethnic relations and addresses issues related to the social construction of race, racial identities, and the impact of immigration on racial dynamics. We next examine racial and ethnic inequality in social and demographic outcomes. The course concludes with readings that explore interracial contact and multiracial populations.

PAM 3400 The Economics of Consumer Policy

Fall. 4 credits. Prerequisite: PAM 2000 or equivalent or permission of instructor. S. Tennyson.

Familiarizes students with the economic analysis of consumer policy issues. Uses the tools of microeconomic analysis to investigate the interaction between government and the marketplace, with an emphasis on how that interaction affects consumers. Examines the rationale for and effects of regulation of industry. Considers alternative theories of regulation, including the capture, economic, and public interest theories. Applies those theories to specific types of regulation, including economic regulation of specific industries (e.g., telecommunications, electricity,

trucking, railroads, postal services) as well as to broader social regulation (e.g., health, safety, environmental). The effects of regulatory reform in numerous industries are also examined. An attempt is made to examine current topics relating to consumer policy.

PAM 3410 Economics of Consumer Law and Protection (also ECON 4410)

Spring. 3 credits. Prerequisite: PAM 2000 or equivalent. S–U or letter grades. J. Gerner. Economic analysis of the roles played both by the courts and by federal and state regulatory legislation in altering consumer markets, consumer behavior, and consumer welfare. Topics include economic analyses of contract law, product liability, accident law and antitrust law, and the activities of such agencies as the Federal Trade Commission, the Food and Drug Administration, and the Consumer Product Safety Commission.

PAM 3500 Contemporary Issues in Women's Health (also FGSS 3500)

Spring. 3–5 credits. A. Parrot. Deals with the history of women in medicine and the historical and cultural treatment of women's health problems. Also addresses health care research and the exclusion of women from research trials and protocols. Reproductive issues, alternative approaches to treatment, medical problems, ethical issues, cancers, factors that contribute to post-traumatic stress disorders, health promotion behaviors, political issues, and routine medical recommendations are also discussed in depth. Students may take the course for a fifth credit, which requires attending a discussion section every other week and observing 12 facilities (e.g., birthing center, mammogram, and ultrasound center, wellness center, hospital labor and delivery unit, La Maze class, women's self-defense class) that provide a variety of women's health care. Some of these visits will be virtual visits available through the course web site, others will require in-person attendance.

PAM 3800 Human Sexuality

Spring. 4 credits. Limited to 150 students. Prerequisite: introductory course in human development and family studies, psychology, or sociology (or equivalent social science course). Recommended: biology course. Two 75-minute lec and one sec per week. A. Parrot.

Provides students with an understanding of the interactions and interrelationships of human behavior that influence sexual development and behavior. Focuses on the evolution of sexual norms, cross-cultural customs, legislation within changing sociopolitical systems, and delivery of services related to sexual issues, needs, and/or problems. Addresses future trends in sexuality.

PAM 4000–4010–4020–4030 Special Studies for Undergraduates

Fall and spring. Credit TBA. S–U or letter grades. Staff.

For advanced independent study by an individual student or for study on an experimental basis with a group of students not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multicopy description of the study they want to undertake on a form available from the department field office. This form must be signed by the instructor directing the study, the student's faculty advisor, and the

department head and filed at course registration or within the change-of-registration period in the college registrar's office, 146 MVR. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the department chair is necessary. Students, in consultation with their faculty supervisor, should register for one of the following subdivisions of independent study.

PAM 4000: Directed Readings. For study that predominantly involves library research and independent reading.

PAM 4010: Empirical Research. For study that predominantly involves data collection and analysis.

PAM 4020: Supervised Fieldwork. For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

PAM 4030: Teaching Apprenticeship

Prerequisite: course (or equivalent) in which student is assisting and has demonstrated high level of performance. For study that includes assisting faculty with instruction.

PAM 4060 Politics and Policy: Theory, Research, and Practice (also GOVT/ALS/AMST 4998)

Fall, spring. Taught in Washington, D.C. For description, see GOVT 4998.

[PAM 4330 Topics in Corporations and Policy]

Spring. 3 credits. Prerequisite: PAM 2000, PAM 3100, PAM 3340. S–U or letter grades. Next offered 2010–2011. R. Geddes.]

PAM 4340 Economics of the Criminal Justice Policy

Fall. 3 credits. Prerequisite: PAM 2000 or equivalent, PAM 3100. S–U or letter grades. E. Owens.

Why do governments attempt to regulate our behavior? What determines which actions are considered criminal? Why do some people, in spite of legal institutions, choose to engage in illicit activity? How do governments attempt to reduce criminal behavior, and how effective are those attempts? This class is intended to introduce you to both theoretical and empirical ways to answer these questions. The content of the class will span economic theory, criminology, and statistics: effective policy makers should be able to understand all three. By the end of the semester, students will be able to think about crime and criminal justice, an intrinsically controversial and emotional topic, from an objective economic perspective.

PAM 4360 Drugs and Gangs

Spring. 3 credits. Prerequisite: PAM 3330, PAM 3100, or permission of the instructor. S–U or letter grades. E. Owens.

Examines the development of illegal markets and criminal gangs in the United States, and evaluates government attempts to limit the size and scope of these activities. We will study the evolution of street gangs, prison gangs, and organized crime from the 19th century to the present, focusing on their role in the drug markets. Students will use economic theory and data to analyze how drug markets respond to government policy.

PAM 4370 Economics of Health Policy (also ECON 4370)

Fall. 3 credits. Prerequisite: PAM 2000, 3100, or equivalent. S-U or letter grades. K. Simon.

Uses the economic tools of policy analysis to understand the health care system and critically evaluate current policy debates. In the past decade, some of the most controversial policies considered by state and federal governments have involved issues that have been studied by health economists and health services researchers. Uses the United States as its main institutional framework but also pays attention to health care topics of international concern, such as the AIDS epidemic.

[PAM 4380 Economics of Public Health (also ECON 4380)]

Fall. 3 credits. Prerequisites: ECON 1110, PAM 2000, 3100, or equivalent. S-U or letter grades. Next offered 2010-2011. D. Kenkel.]

[PAM 4440 Violence against Women: Policy Implications and Global Perspectives (also FGSS 4480)]

Spring. 3 credits. Next offered 2010-2011. A. Parrot.]

PAM 4450 Regulating Financial Institutions

Spring, weeks 7 through 14, meeting time TBD. 3 credits. Prerequisites: ECON 1110, PAM 2000, PAM 3400 or equivalent. S-U or letter grades. S. Tennyson.

Examines financial institutions and the way that these institutions are regulated in the United States and in other countries. The course provides a history and overview of regulatory institutions, considers the intent of regulatory policies, and evaluates regulatory outcomes. An important focus of the course will be on current public policy issues relating to financial institutions regulation.

PAM 4460 Economics of Social Security (also ECON 4460)

Fall. 3 credits. Prerequisite: PAM 2000 or equivalent. S-U or letter grades. R. Burkhauser.

Provides students with an "economic tool-kit" for evaluating social policies. Economic analysis is used to predict the behavioral and distributional consequences of such policies. Students learn to use computer software on data from the Current Population Survey to estimate the economic well-being of both older people with disabilities, show how sensitive your results are to the methods used, and stimulate the effects of alternative policies on these outcomes.

PAM 4470 Families and Social Inequality (also SOC 4470)

Fall. 3 credits. Prerequisite: PAM 2030, PAM 2220, SOC 2208, or equivalent social science course. S-U or letter grades. K. Musick.

Disparities in family life are widening in the U.S., with important implications for the well-being of family members and the reproduction of inequality from one generation to the next. Using tools of demographic analysis, this course explores growing education and income differences in family patterns (e.g., marriage, divorce, childbearing, and parenting), analyzing the forces behind these changes and the potential consequences for children's life chances.

[PAM 4570 Innovation and Entrepreneurship in the Health Care Industry]

Fall. 3 credits. Prerequisite: PAM 4350 or permission of instructor. Next offered 2010-2011. J. Kuder.]

[PAM 4760 Economic Evaluations in Health Care]

Fall. 3 credits. Recommended: background in microeconomics and statistical tools. S-U or letter grades. Next offered 2010-2011. Staff.]

PAM 4770 Child Policy

Fall. 3 credits. Prerequisites: PAM 2000, PAM 3100. S-U or letter grades. J. Gerner. Topics in public policy dealing with children, with a special emphasis on the impacts of policy on child outcomes. Topics include policy affecting education attendance, high stakes testing and its impact on performance, policy impacts on family composition and change, and the effects of these on child outcomes.

PAM 4980 Honors Seminar

Fall. 3 credits. Prerequisites: PAM 2100, 2150, and 3100. Letter grades only. S. Sessler.

Designed to help guide students through the development of their honors thesis. The objective of the course is to help students frame a research question that is appropriate for an honors thesis, identify an appropriate methodology to use in answering this question, identify data that can be used to answer this question, and identify literature appropriate to this question. Students will also work collaboratively in critiquing research questions and techniques to be used. Students will meet in a seminar-style class each week and will also meet with the students individually and with their research mentor throughout the semester as they work on their thesis question and methods. Students who wish to participate in the PAM Honors Program must enroll in this course during their senior year. Students must receive a grade of B or better to continue in the Honors Program.

PAM 4990 Honors Program

Fall or spring. Credit TBA. Prerequisite: PAM 4980. Letter grades only. PAM faculty. Provides students with the opportunity to undertake basic or applied research that will be preparation of a thesis representing original work of publishable quality. Intended for students who desire the opportunity to extend their interests and efforts beyond the current course offerings in the department. Furthermore, the program is designed to offer the student the opportunity to work closely with a professor on a topic of interest. The number of hours of thesis credit is determined by the student's research mentor. See the director of undergraduate studies for more details.

PAM 5310 Ethics, Public Policy in American Society

Fall. 3 credits. Prerequisite: senior or graduate standing. J. Ziegler. Explores current issues of ethics and public policy against a background of theories of ethical behavior. Examines questions of how public officials and managers of public and nonprofit agencies and private enterprises act. How do standards of ethical behavior in the professions get established? How are public policy issues with ethical implications

resolved? Readings are drawn from political philosophy, contemporary social science, and imaginative writing. Class participation is essential.

[PAM 5320 The Intergovernmental System: Analysis of Current Policy Issues]

Fall. 3 credits. Prerequisite: graduate students or seniors who have had course in American government. Next offered 2010-2011. J. Ziegler.]

PAM 5470 Microeconomics for Management and Policy

Spring. 4 credits. S-U or letter grades. Sloan students only. W. White.

Introduces microeconomic theory and its application to decision making in the management and policy arenas. Places special emphasis on the economic environment of health care organizations and the problems faced by managers in this environment.

PAM 5520 Health Care Services: Consumer and Ethical Perspectives

Fall. 3-4 credits; 4-credit option may be used as Biology and Society senior seminar option. Limited to 30 students. Prerequisite: undergraduates by permission of instructor. A. Parrot.

Focuses on consumer and ethical issues faced by professionals in the health care field today. Broad topics discussed include ethical standards and guidelines, health care costs and accessibility of services, government role in health care delivery, health care as a right or privilege, private industry role in health care, services for the medically indigent and elderly, practitioner burnout and training, ethics of transplant surgery and funding, reproductive technology, AIDS research and funding, animals in medical research, right to die, and baby and granny Doe cases.

PAM 5540 Legal Aspects of Health Care

Spring. 3 credits. Prerequisites: PAM 5570 or permission of instructor. Offered alternate years. H. Allen.

Introduces principles of the law that specifically are applicable to health-service delivery. Topics include the liability of hospitals and their staff and personnel for injuries to patients; medical records and disclosure of information; consent to medical and surgical procedures; responsibility for patients' personal property; collection of bills; medical staff privileges; and confidential communications.

[PAM 5560 Managed Health Delivery Systems: Primary-Ambulatory Care]

Fall. 3 credits. Prerequisite: PAM 5570 or permission of instructor. Next offered 2010-2011. J. Kuder.]

PAM 5570 Health Care Organization

Fall. 3 credits. Limited to 30 students. Prerequisite: Sloan students or permission of instructor. J. Kuder.

Graduate-level introduction to the organization of health providers in the United States, the interrelationships of health services and the major sources and methods of paying for care. Describes how health services are structured in the United States and how these different services interrelate along the continuum of care. Describes and analyzes organization, delivery, and financing issues from a variety of perspectives using specific performance criteria (e.g., equity, quality, efficiency). Also presents innovations by the public and private

sectors in the delivery and reimbursement of health care.

PAM 5620 Finance (also AEM 3240)

Spring. 3 credits. Staff.
For description, see AEM 3240.

PAM 5630 Health Care Financial Management II

Fall. 3 credits. Prerequisite: PAM 5620 or other financial management course.
S. Nicholson.

Focuses on the financial analyses that managers in the health care industry use to make strategic and operating decisions. Begins by examining how health insurers design and price their products and manage enrollees' medical expenditures. Next reviews two different methods of valuing a medical product/service, and two methods of estimating the value of a company. The four valuation methods covered are: net present value of free cash flows, decision tree analysis/real options, multiples, and the venture capital method. Seven cases allow students to apply these skills to examine decisions/situations such as: determining why a Medicare HMO is losing money and recommending a redesigned benefit and reimbursement structure; estimating a health system's profitability by product line; valuing a drug that is being developed; valuing a pharmaceutical company; valuing a drug using decision-free analysis in determining whether a medical device company should go public and how it should price its products.

PAM 5640 Health Care Resource Management and Quality Improvement

Fall. 3 credits. Prerequisite: strong basic computer skills. S-U or letter grades.
S. Nicholson.

Exposes students to the opportunities and challenges of using information technologies (IT), such as computerized physician order entry systems, electronic medical records, medical decision support systems, handheld devices for physicians, and remote patient monitoring devices, to improve the quality of medical care and/or reduce costs. Focuses on the manager's role in the application of IT to assess and improve the quality of medical care. Students will develop a business plan for a company that uses IT to improve the quality of medical care in the U.S. health care system.

PAM 5660 Strategic Management and Organizational Design of Health Care Systems

Spring. 3 credits. Staff.
Examines strategy and design issues faced by health care organizations. Topics include analysis of market conditions, organizational culture issues, development of an organizational mission and management strategy, the management of professionals, and the importance of roles, structure, and inter- and intra-institutional relationships within organizations. Taught via a case study approach.

PAM 5670 Health Policy

Fall. 3 credits. Prerequisite: Sloan M.H.A. students, Ph.D. students, or permission of instructor. K. Simon.
Addresses major health policy issues and the critical processes that influence them. Focuses primarily on the United States, with some coverage of health policy in other countries. Topics include Medicare, Medicaid, the uninsured, public health, the effect of welfare policy on health care, managed care

development and regulation, state and federal health care reform, and many others. The course analyzes the politics of health policy in terms of legislative and executive processes; the forces involved including economic, social, ethical, and political factors; and key players in health policy, such as special interest groups, public agencies, and elected officials.

PAM 5690 Regression Analysis and Managerial Forecasting

Fall. 3 credits. Prerequisite: at least one statistics course. T. Evans.
Teaches various statistical methods for managerial decision making, with a particular emphasis on regression and forecasting. Other topics include ANOVA, correlation, confounding, interaction, and statistical process control. Emphasizes applications to health care organizations.

PAM 5700 Health Care Accounting

Fall. 4 credits. Core course for Sloan M.H.A. students. W. Schlesinger.
Introduces the basic concepts of financial and managerial accounting with emphasis on health care applications. Explains the measurement system of business operations, business valuation, financial reporting, budgeting, cost allocation, service and product costing, and special reports for managerial use. Ethical and international issues are integrated throughout the course materials with real world applications. At the conclusion of the course, students should be able to read, understand, and analyze the annual financial reports of an organization. Collaborative learning, cases, discussions, readings, researches, presentation, speakers, problem solving, videotapes, and lectures are used as teaching pedagogy.

PAM 5710 Organizational Development/ Human Resource Management in Health Care Organization

Fall. 3 credits. Sloan students only.
N. Fabrizio.
Explores (1) the theoretical foundation of organizational theory, research, and human resource management with an emphasis on implementation; (2) real-world problems while analyzing, exploring, and discussing varied interpretations of selected cases; (3) the building blocks of managerial activity; internal organizational issues; performance issues related to organization design; and strategic issues. Key organizational change and development concepts enhance students' perspectives on how the theories, strategies, and practices relate to today's organizations. The course serves as a framework to establish the theory and both the conceptual and competency foundations necessary for applying interventions.

PAM 5740 Short Course in Fundamentals of Health Facility Planning for Managers

Spring. 1 credit. B. Hollis.
Provides MHA and other students who may be interested in careers in health care management with a basic familiarity regarding some of the concepts and terminology related to health facility planning projects. The course will touch on areas that a manager might encounter, including working with designers, the relationship between strategic planning issues and facility planning, basic cost estimating techniques, simplified plan interpretation, and use of architectural and engineering scales. The course will have two primary components. One portion will be lectures and hands-on demonstrations on plan

reading/measurements and an overview of the process of project planning. We anticipate a tour of an active or recently completed project at either Cornell or Cayuga Medical Center as time allows. The other will involve live or videoconference presentations from invited practitioners and researchers in the health facilities area.

PAM 5760 Long-Term Care and Lifestyle Alternatives for the Older Adult

Spring. 1 credit. M. Weidner.
Provides students exposure to, and fosters critical thinking about, policy and operational issues related to health care and living alternatives for the well, near frail, and frail older adult. Preliminary readings will introduce the student to societal issues of the aging, clinical issues facing the older adult, and management operations for nursing homes, independent living communities, assisted living, and home care. Emphasis will be placed on student interaction with instructors and other seminar participants regarding society and management issues. Case studies will be used to enhance student interaction and participation.

PAM 5770 Marketing for Health Care Managers

Fall. 3 credits. Prerequisites: microeconomics and permission of instructor. D. Perosio.
Introduces students to the substantive and procedural aspects of marketing strategy and management. The course is designed to convey the key concepts of marketing and how they fit into the larger context of overall management strategy and decisions. Both the practical "how" and the fundamental "why" of marketing activities will be explored. Course examples rely heavily on actual situations and experiences in the health care industry. Students will apply their knowledge of marketing and health care management to the development of a marketing plan.

PAM 5810 Measuring and Evaluating Health Program Performance and Quality

Spring. 3 credits. Prerequisites: PAM 5570 and a basic multivariate statistics course or permission of instructor. S-U or letter grades. J. Kuder.
This course is designed for policy makers, health systems managers, and beginning health services researchers that want an applied introduction to using health system evaluation tools and literature to enhance system and program performance and improve quality.

PAM 5900 Special Topics in Health Administration and Finance

Fall and spring. 1-3 credits. Adjunct faculty.
A special topics course specifically designed for students in the Sloan Program in Health Administration. Possible multiple offerings using adjunct faculty teaching in areas of expertise not covered in depth in the Sloan core curriculum and relevant to students preparing for careers in health management. Format ranges from intensive courses offered over several full days to longer courses meeting on a weekly basis.

PAM 5951/2 Field Studies in Health Administration and Planning

Fall or spring. 5951, fall. 1 credit; 5952, spring, 3 credits; 4 total credits. Capstone course for second-year Sloan students.
J. Kuder.

Students interested in developing administrative and program-planning research skills are given an opportunity to evaluate an ongoing phase of health care agency activity in the light of sound administrative practice and principles of good medical care. In planning and carrying out the research, students work closely with a skilled practicing administrator and with members of the faculty.

PAM 5990 Challenges and Trends in the Health Services Industry

Fall and spring. 1 credit. Prerequisite: graduate standing or permission of instructor. S-U grades only. W. White. Provides students with information and exposure to current and emerging issues in the health services industry. Topics may include financial management of health care facilities, human resource management, information systems, cost-effective clinical decision making, quality measurement and outcomes, public health, and entrepreneurship in the health services industry.

PAM 6000 Special Problems for Graduate Students

Fall and spring. Credit TBA. S-U or letter grades. Staff. Independent advanced work by graduate students recommended by their chair and approved by the department chair and the instructor.

[PAM 6030 Experimental, Quasi-Experimental, and Economic Evaluation Methods

Spring. 3 credits. Highly recommended: background in statistics (e.g., AEM 7100 or equivalent) and microeconomics (e.g., PAM 2000 or ECON 6390). Next offered 2010-2011. E. Peters.]

[PAM 6040 Qualitative, Survey, and Mixed-Method Approaches to Policy Research

Spring. 3 credits. Prerequisite: Ph.D. students. Highly recommended: previous course in social science research methods. Next offered 2010-2011. M. Waller.]

PAM 6060 Demographic Techniques (also DSOC 6080)

Spring. 3 credits. S-U or letter grades. D. Gurak and D. Lichter.

This course provides an introduction to various demographic data sources (e.g., decennial census and vital registration data), measures of demographic processes and population structure (e.g., fertility rates and segregation indices), and standard demographic techniques (e.g., life tables, rate standardization, and population forecasting) used in social demography. The course emphasizes the application of demographic tools and interpretation.

PAM 6090 Empirical Strategies for Policy Analysis

Fall. 3 credits. Prerequisite: graduate course in econometrics (e.g., ILRLE 7480-7490 or AEM 7100). J. Matsudaira. This course focuses on empirical strategies to identify the causal effects of public policies and programs. The course will use problem sets based on real-world examples and data to examine techniques for analyzing non-experimental data including control function approaches, matching methods, panel-data methods, selection models, instrumental variables, and regression-discontinuity methods. The emphasis throughout, however, will be on the critical role of research design

in facilitating credible causal inference. The course will aid students in both learning to implement a variety of statistical tools using large data sets, and in learning to select which tools are best suited to a given research project.

PAM 6250 Economics of Family Policy

Fall. 3 credits. Prerequisite: PAM 6390 or ECON 6090 or permission of instructor. S-U or letter grades. E. Peters.

This course uses an economic framework to study family policy. Both single-agent and multiple-agent (e.g., game theoretic and bargaining) frameworks are used to understand the impact of family policy on outcomes and behavior. Theoretical models of fertility decisions, household production, time allocation, investments in children, marriage markets, household formation and dissolution decisions, bargaining over resource allocation within the household, and inter- and intra-generational transfers across households are developed. The theoretical models are applied to family policies such as child care subsidies, family leave, divorce laws and child support, welfare reform, family planning, government subsidies to education, and social security. Empirical applications are presented for both developed and developing countries.

PAM 6280 Family Demography (also SOC 6280)

Spring. 3 credits. S-U or letter grades. K. Musick.

This graduate seminar explores changes in family behaviors and household relationships from a demographic perspective. It focuses centrally on contemporary trends in the U.S., considering (often competing) interpretations of the causes and consequences of family change and variation. Emphasis will be placed on critically evaluating research in this area, including assessments of data quality, research design, and causal inference. Topics include cohabitation and marriage, divorce, fertility, family structure, and the intersection of work and family.

[PAM 6330 Seminar in Pharmaceutical Policy Issues

Spring. 2 credits. Meets once a week. S-U or letter grades. Next offered 2010-2011. S. Tennyson.]

[PAM 6350 Consumers, Information, and Regulatory Policy

Fall. 3 credits. Prerequisites: PAM 6390 or calculus and intermediate microeconomics. Next offered 2010-2011. S. Tennyson.]

PAM 6410 Health Economics I (also ECON 6410)

Fall. 3 credits. First course in Ph.D.-level health economics sequence. Prerequisites: Ph.D.-level courses in microeconomic theory and econometrics. J. Cawley and staff.

Comprehensive course covering microeconomic theory and its application to health and health care markets. Topics include consumer decision making, the theory of the firm, welfare economics, monopolies and oligopolies, and market imperfections. Applications in health economics include the demand for health, rational addiction, the industrial organization of health care, cost-effectiveness analysis, price discrimination by health care providers, how consumers respond to information about health care, adverse selection in health insurance, and the moral hazard created by physician compensation

strategies. Each student writes a research paper, testing predictions from microeconomic theory by acquiring suitable data and estimating the appropriate econometric model, and presents his or her findings in a research seminar.

PAM 6420 Health Economics II

Spring. 3 credits. Prerequisites: Ph.D.-level courses in microeconomic theory and econometrics. Staff.

Covers microeconomic theory and its applications to health and health care markets. Topics include consumer demand for health and health behaviors, the supply side of health promotion, the industrial organization of health care, and cost-benefit and cost-effectiveness analysis of health interventions. Second course in Ph.D.-level health economics sequence, but the courses may be taken in any order.

PAM 6900 Professional Seminar in Public Policy

Fall. 2 credits. Prerequisite: Enrollment limited to Ph.D. and M.S. students in PAM (as well as Ph.D. students funded by PAM). S-U or letter grades. R. Dunifon

This proseminar introduces new graduate students to the field of PAM. Students will read and discuss research papers by PAM faculty as well as other readings that provide an overview of the field of Policy Analysis and Management and offer important tools and skills that can be used throughout the graduate career.

PAM 8990 Master's Thesis and Research

Fall and spring. Credit TBA. Prerequisite: permission of graduate committee chair and instructor. S-U or letter grades.

PAM 9990 Doctoral Thesis and Research

Fall and spring. Credit TBA. Prerequisite: permission of graduate committee chair and instructor. S-U or letter grades.

FACULTY ROSTER

Ashdown, Susan, Ph.D., U. of Minnesota. Assoc. Prof., Fiber Science & Apparel Design
 Avery, Rosemary J., Ph.D., Ohio State U. Prof. and Chair, Policy Analysis and Management
 Becker, Franklin D., Ph.D., U. of California, Davis. Prof., Design and Environmental Analysis
 Belmont, Matthew, Ph.D., Boston U. Asst. Prof., Human Development
 Brainerd, Charles, Ph.D., Michigan State U. Prof., Human Development
 Burkhauser, Richard, Ph.D., U. of Chicago. Prof., Policy Analysis and Management
 Casasola, Marianella, Ph.D., U. of Texas, Austin. Asst. Prof., Human Development
 Cawley, John, Ph.D., U. of Chicago. Assoc. Prof., Policy Analysis and Management
 Ceci, Stephen J., Ph.D., U. of Exeter (England). Prof., Human Development
 Chu, Chih-Chang, Ph.D., Florida State U. Prof., Fiber Science & Apparel Design
 Danko, Sheila, M.I.D., Rhode Island School of Design. Prof. and Chair, Design and Environmental Analysis
 Depue, Richard, Ph.D., U. of Oklahoma. Prof., Human Development
 Dunifon, Rachel, Ph.D., Northwestern U. Assoc. Prof., Policy Analysis and Management

- Eckenrode, John J., Ph.D., Tufts U. Prof., Human Development
- Elliott, John, M.E. Des., U. of Calgary (Canada). Assoc. Prof., Design and Environmental Analysis
- Eshelman, Paul E., M.F.A., U. of Illinois. Prof., Design and Environmental Analysis
- Evans, Gary, Ph.D., U. of Massachusetts, Amherst. Prof., Design and Environmental Analysis
- Feathers, David, Ph.D., U. of Buffalo, SUNY. Asst. Prof., Design and Environmental Analysis
- Frey, Margaret, Ph.D., North Carolina State U. Assoc. Prof., Fiber Science & Apparel Design
- Geddes, Raymond R., Ph.D., U. of Chicago. Assoc. Prof., Policy Analysis and Management
- Gerner, Jennifer L., Ph.D., U. of Wisconsin. Prof., Policy Analysis and Management
- Gibson, Kathleen J., M.A., Ohio State U. Assoc. Prof., Design and Environmental Analysis
- Glass, Jennifer, Ph.D., U. of Wisconsin. Prof., Policy Analysis and Management
- Hamilton, Stephen F., Ed.D., Harvard U. Prof., Human Development, Co-Director, Family Life Development Center
- Hazan, Cindy, Ph.D., U. of Denver. Assoc. Prof., Human Development
- Hedge, Alan, Ph.D., U. of Sheffield (England). Prof., Design and Environmental Analysis
- Hinestroza, Juan, Ph.D., Tulane U. Asst. Prof., Fiber Science & Apparel Design
- Hua, Ying, Ph.D., Carnegie Mellon U. Asst. Prof., Design and Environmental Analysis
- Jennings, Jan, M.S., Oklahoma State U. Assoc. Prof., Design and Environmental Analysis
- Jirousek, Charlotte, Ph.D., U. of Minnesota. Assoc. Prof., Fiber Science & Apparel Design
- Kenkel, Donald, Ph.D., U. of Chicago. Prof., Policy Analysis and Management
- Koslowski, Barbara, Ed.D., Harvard U. Assoc. Prof., Human Development
- Kuder, John, Ph.D., U. of Michigan. Assoc. Prof., Policy Analysis and Management
- Kushnir, Tamar, Ph.D., U. of California. Asst. Prof., Human Development
- Laquatra, Joseph Jr., Ph.D., Cornell U. Prof., Design and Environmental Analysis
- Lemley, Ann T., Ph.D., Cornell U. Prof. and Chair, Fiber Science & Apparel Design
- Lewis, Van Dyk, Ph.D., U. of Central England, Birmingham. Assoc. Prof., Fiber Science & Apparel Design
- Lichter, Daniel, Ph.D., U. of Wisconsin, Madison. Prof., Policy Analysis and Management
- Loeckenhoff, Corinna, Ph.D., Stanford U. Asst. Prof., Human Development
- Lovenheim, Michael, Ph.D., U. of Michigan. Asst. Prof., Policy Analysis and Management
- Lucarelli, Claudio, Ph.D., U. of Pennsylvania. Asst. Prof., Policy Analysis and Management
- Lust, Barbara C., Ph.D., City U. of New York. Prof., Human Development
- Mathios, Alan, Ph.D., U. of Pennsylvania. Prof., Policy Analysis and Management; Dean
- Matsudaira, Jordan, Ph.D., U. of Michigan. Asst. Prof., Policy Analysis and Management
- Maxwell, Lorraine E., Ph.D., City U. of New York. Assoc. Prof., Design and Environmental Analysis
- Mete, Fatma, Ph.D., U. of Leeds (UK). Assoc. Prof., Fiber Science & Apparel Design
- Mikels, Joseph A., Ph.D., U. of Michigan. Asst. Prof., Human Development
- Musick, Kelly, Ph.D., U. of Wisconsin–Madison. Assoc. Prof., Policy Analysis and Management
- Netravali, Anil, Ph.D., North Carolina State U. Prof., Fiber Science & Apparel Design
- Nicholson, Sean, Ph.D., U. of Wisconsin, Madison. Assoc. Prof., Policy Analysis and Management
- Obendorf, Sharon K., Ph.D., Cornell U. Prof., Fiber Science & Apparel Design, Assoc. Dean
- Ong, Anthony D., Ph.D., U. of Southern California. Asst. Prof., Human Development
- Owens, Emily, Ph.D., U. of Maryland. Asst. Prof., Policy Analysis and Management
- Parrot, Andrea, Ph.D., Cornell U. Prof., Policy Analysis and Management
- Peters, H. Elizabeth, Ph.D., U. of Chicago. Prof., Policy Analysis and Management
- Pillemer, Karl A., Ph.D., Brandeis U. Prof., Human Development
- Pollak, Patricia B., Ph.D., Syracuse U. Assoc. Prof., Policy Analysis and Management
- Reyna, Valerie, Ph.D., Rockefeller U. Prof., Human Development
- Robertson, Steven S., Ph.D., Cornell U. Prof., Human Development
- Sassler, Sharon, Ph.D., Brown U. Assoc. Prof., Policy Analysis and Management
- Savin-Williams, Ritch C., Ph.D., U. of Chicago. Prof. and Chair, Human Development
- Simon, Kosali, Ph.D., U. of Maryland. Assoc. Prof., Policy Analysis and Management
- Tennyson, Sharon, Ph.D., Northwestern U. Assoc. Prof., Policy Analysis and Management
- Trochim, William M. K., Ph.D., Northwestern U. Prof., Policy Analysis and Management
- Waller, Maureen R., Ph.D., Princeton U. Assoc. Prof., Policy Analysis and Management
- Wang, Q. I., Ph.D., Harvard U. Asst. Prof., Human Development
- Wells, Nancy, Ph.D., U. of Michigan. Assoc. Prof., Design and Environmental Analysis
- Wethington, Elaine, Ph.D., U. of Michigan. Assoc. Prof., Human Development
- White, William, Ph.D., Harvard U. Prof., Policy Analysis and Management
- Williams, Wendy M., Ph.D., Yale U. Assoc. Prof., Human Development
- Lecturers**
- Allen, Henry, J.D., Cornell U. Lec, Policy Analysis and Management
- Beck, Sam N., Ph.D., U. of Massachusetts. Sr. Lec., Urban Semester
- Breen, Nancy, Ph.D., Syracuse U. Lec., Fiber Science & Apparel Design
- Curtis, Steven H., B.A., Syracuse U. Lec., Design and Environmental Analysis
- Evans, Thomas A., Ph.D., Clemson U. Lec, Policy Analysis and Management
- Fabrizio, Nick, Ph.D., Walden U. Lec., Policy Analysis and Management
- Gilmore, Rhonda, M.A., Cornell U. Lec., Design and Environmental Analysis
- Hollis, R. Brooke, M.B.A., Cornell U. Lec, Policy Analysis and Management
- Lewis, Jeffrey, Ph.D., U. of Maryland, College Park. Lec., Policy Analysis and management
- Perosio, Debra, Ph.D., Cornell U. Lec, Policy Analysis and Management
- Racine, Anita, Ph.D., Cornell U. Sr. Lec., Fiber Science & Apparel Design
- Ross-Bernstein, Judith, M.Ed., Northwestern U. Sr. Lec., Human Development
- Schelhas-Miller, Christine, Ed.D., Harvard U. Sr. Lec., Human Development
- Schlesinger, Warren, M.B.A., Cornell U. Lec., Policy Analysis and Management
- Weidner, Michael, M.B., Cornell U. Lec, Policy Analysis and Management

SCHOOL OF INDUSTRIAL AND LABOR RELATIONS

ADMINISTRATION

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Suzanne Bruyere, associate dean, outreach

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Christopher Crooker, director, external relations

Laura Lewis, director, office of student services

William J. Sonnenstuhl, graduate faculty representative

Tove Hammer, editor, *Industrial and Labor Relations Review*

DEGREE PROGRAMS

Industrial and Labor Relations	Degree
	B.S.
	M.I.L.R.
	M.P.S.
	M.S.
	Ph.D.

THE SCHOOL

The School of Industrial and Labor Relations at Cornell (ILR) is a small school within a large university. It tries to maintain the small-college atmosphere expected of an institution that has about 800 undergraduates and approximately 200 graduate students, even as ILR students participate fully in the activities of the larger Cornell community.

ILR students study in modern, technologically advanced lecture halls, seminar rooms, and libraries.

Students enrolled in the School of Industrial and Labor Relations at Cornell may take a substantial number of courses in the other six undergraduate colleges and schools of the university, including the College of Arts and Sciences. Cornell students have access to all of the libraries and other services of the university.

The school operates in four areas: (1) resident instruction, (2) extension and outreach, (3) research, and (4) publications. It provides instruction to undergraduates and graduate students who are preparing for careers in industrial and labor relations, as well as to men and women already engaged in industrial relations activities and the general public through its Extension and Outreach.

The school's Conference Center, part of the extension division, initiates and hosts conferences covering the full scope of

industrial and labor relations. The center provides continuing education and information to practitioners and scholars.

The Research Division develops materials for resident and extension teaching and originates studies in industrial and labor relations. The Publications Division publishes and distributes the research results.

GRADUATE DEGREES

More than 150 students on the Cornell campus are enrolled in graduate study in industrial and labor relations, one of the largest graduate fields in the university. Students may work toward the degrees of master of industrial and labor relations, master of professional studies, master of science, and doctor of philosophy. For further information on graduate programs, contact the Graduate Office, School of Industrial and Labor Relations, Cornell University, 214 Ives Hall, Ithaca, NY 14853-3901.

DEPARTMENTS OF INSTRUCTION

Courses in the school are organized into six departments:

Collective Bargaining, Labor Law, and Labor History

The Department of Collective Bargaining, Labor Law, and Labor History brings together a diverse group of faculty members, all of whom are involved in researching and teaching about workers, employers, and the government policies that affect them. Our courses explore ILR issues in American society within a global framework using methods drawn from the social sciences, the humanities, and the legal professions.

Human Resource Studies

The Department of Human Resource Studies consists of world-class faculty members engaged in research, teaching, and practice. These faculty members play integral roles in the administration of the Center for Advanced Human Resource Studies (CAHRS), an ILR-based research center funded by over 50 corporations, and the ILR Executive Education Program, which offers advanced training to HR practitioners. The goal in teaching is to balance a rigorous academic research approach with a real-world practice orientation. In this way students are provided with state-of-the-art knowledge relevant to managing human resources in organizations.

International and Comparative Labor

The Department of International and Comparative Labor is concerned with industrial relations, unions, human-resource studies, and labor markets throughout the world. World-renowned faculty members are authorities on issues related to labor in Latin America, Europe, Asia, and Africa, as well as

North America, and bring this knowledge to bear on the courses they teach to prepare students to understand the global marketplace.

Labor Economics

The Department of Labor Economics deals with labor markets, that is, the institutional arrangements, terms, and conditions under which workers supply their labor and under which firms demand their labor. Faculty members are especially concerned with understanding the workings of labor markets and the effects of various public policies. The topics dealt with in courses and research include analysis of the labor force, employment and unemployment, wages and related terms of employment, income distribution, income security programs, health and safety in industry, retirement, pensions and social security, economic aspects of collective bargaining, and economic demography.

Organizational Behavior

The psychologists and sociologists in the Department of Organizational Behavior use discipline-based theoretical perspectives to examine an array of empirical workplace phenomena. Their teaching and research focus on the impact of environmental, technological, and interpersonal relationships on work group and organizational dynamics.

Social Statistics

Faculty members in the Department of Social Statistics conduct research in the field of economic and social statistics. In applying their research results to their teaching, they provide their students with cutting-edge training on the principles of statistical reasoning, statistical methods, and the application of statistical tools of analysis.

A full list of required and elective courses is available from the Office of Student Services, 101 Ives Hall.

RESIDENT INSTRUCTION

This division conducts the on-campus programs leading to the degrees of bachelor of science, master of industrial and labor relations, master of professional studies, master of science, and doctor of philosophy from Cornell.

Office of Student Services

Staff members from the Office of Student Services, 101 Ives Hall, work closely with faculty members and faculty committees to administer degree programs for the school and many of the school's support services. The office's responsibilities include admitting and orienting new students, maintaining students' personal and academic records, providing information on special study opportunities such as study abroad, and counseling students on personal and academic

concerns. The office also works closely with seniors who are planning graduate study.

Counseling and Advising

New students are advised on orientation, academic procedures, and course registration by counselors in the Office of Student Services.

Each of the school's academic departments names faculty members to serve as advisors for students who wish to consult with them regarding career possibilities in the field, research opportunities, postgraduate programs, or similar matters. Questions or issues related to graduation requirements, course registration, and related academic procedures should be directed to counselors in the Office of Student Services.

Multicultural Programs

The School of Industrial and Labor Relations values diversity and is responsive to the unique social, academic and cultural contributions and needs of multicultural students. The School is committed to providing students with support that will enhance academic achievement, career development, and personal growth. The assistant director for multicultural affairs in the Office of Student Services works in conjunction with many university programs to provide services that ensure academic success and an enjoyable quality of life for ILR students. For more information, see the Multicultural Affairs web site: www.ilr.cornell.edu/studentservices/advising/multicultural.

STUDY OPTIONS

Several study options are open to ILR undergraduates, making it possible to tailor a program to fit special circumstances.

Some students elect to spend a semester in New York City, Albany, or Washington, D.C., with a chance to observe actual labor problem solving as interns in congressional offices, labor organizations, personnel offices, and state and federal agencies. For more information, see "Special Academic Programs" below.

Study abroad opportunities are available in numerous countries and foreign universities. Qualified students may spend a semester or a full year studying abroad.

A number of ILR courses deal directly with today's workplace issues and involve fieldwork in the Ithaca area and elsewhere in the country.

With early planning, some students may apply for and earn the M.S. degree in the fifth year.

Minors

Students may pursue minors in any department in any college that offers them, subject to limitations placed by the department offering the minor or by the students' major. Completed minors will appear on the student's transcript. Not all departments offer minors. Consult the appropriate section in this catalog or contact the appropriate department for information on minors offered and how to pursue a minor.

Study in Absentia

Registration in absentia enables a student to seek admission in another American institution for a semester or a year and transfer credit toward completion of the Cornell degree. This study option requires the development of a plan of study, a statement of appropriate reasons for study away from the university (e.g., availability of courses not offered at Cornell), good academic standing, approval of the plan by the director of student services, and payment of a special in absentia registration fee.

Leave of Absence or Withdrawal

Students who desire to withdraw or take a personal leave of absence from the university should schedule an interview with a counselor in the Office of Student Services. Counselors will assist students in contacting the appropriate offices or departments of the university, if necessary. All health leaves are handled by Gannett Health Center (www.gannett.cornell.edu).

REQUIREMENTS FOR GRADUATION

To earn the Cornell bachelor of science degree in industrial and labor relations, a student must successfully complete 120 credits. This requires eight semesters of full-time study (30 credits a year on average), including work done while on an approved credit internship or study abroad program. Those who enter the school as transfer students will be required to complete 4 to 6 semesters in full-time residence, depending on the number of full-time semesters completed at another institution. Exceptions may be made by petitioning the ILR Academic Standards and Scholarships Committee. Those enrolled in the employee degree program, who typically study on a part-time basis, will be exempt from this requirement.

New Curriculum Effective Fall 2008

First Year

FALL

First-year writing seminar*	3
ILR colloquium (introduction to ILR School, ILRID 1500)**	1
Introduction to Organizational Behavior (ILROB 1220)**	3
History of American Labor (ILRCB 1100)**	3
Introductory Microeconomics (ECON 1110)*	3
Elective	(3)
PE (university requirement)	

SPRING

First-year writing seminar*	3
Introductory Macroeconomics (ECON 1120)*	3
Electives	(9)
PE (university requirement)	

Sophomore Year

FALL

Statistical Reasoning (ILRST 2100)**	4
Labor and Employment Law (ILRCB 2010)**	3
Human Resource Management (ILRHR 2600)**	3

Advanced Writing†	3
Electives	(3)
SPRING	
Collective Bargaining (ILRCB 2050)**	3
Economics of Wages and Employment (ILRLE 2400)**	3
Western Intellectual Tradition†	3
Cultural Perspectives†	3
Science and Technology†	3
<i>Junior and Senior Years</i>	
ILR Elective courses—40 credits	40

- Must include at least one course from an approved list in each of the following three areas: International and Comparative elective, Labor History elective, and Economic Policy elective
- Minimum of 24 credits of ILR course work, including 4950 Honors, 4990 Independent Study—with a maximum of 16 credits for non-ILR courses at Cornell as approved in ILR departments
- Maximum of 12 credits from foreign language or advanced math
- May include up to 9 credits for one semester abroad or 15 credits for a full year abroad
- Maximum of 16 credits in a credit internship program

Additional general elective credits (in addition to distribution requirements) 12

Minimum total credits required for graduation 120

*Required courses usually taken in the College of Arts and Sciences

**Required courses taken in the ILR School

†Distribution credits (courses you choose that satisfy requirements in certain categories)

Physical Education credit does not count toward the 120 credits

ILR Math Requirement

A student who took AP calculus in high school and scored a 3 or better on the AB exam or subscore of BC exam has fulfilled the ILR math requirement. If AP calculus wasn't completed, or if the scores noted above were not achieved, the student is expected to take and pass the ILR Math Assessment before registering for required courses in Statistics and Labor Economics.

The ILR Math Assessment is scheduled in August, January, and May. Those who do not pass in the first attempt are expected to register in an appropriate math course and pass the assessment *before the beginning of their third semester* in the school. Any student who cannot meet the requirement by the beginning of the third semester is enrolled for a terminal semester and is expected to leave the school thereafter.

Transfer students are expected to meet the same standards in math: either present the score required by Cornell University for AP calculus (AB or BC) credit or pass the ILR Math Assessment before being permitted to register in required courses in statistics or labor economics, with a terminal semester

possible after failing the assessment given at the beginning of a third semester as an ILR student.

SCHEDULING AND ATTENDANCE

Schedule Changes

Occasionally it may be necessary for a student to request changes in his or her course schedule either before a semester begins or during the semester. Such requests must be directed to the Office of Student Services to avoid possible loss of academic credit.

Class Attendance

It is each student's responsibility to attend all scheduled classes unless excuses have been approved by the faculty members. In some courses an instructor may permit a maximum number of class absences without a grade penalty or recommend withdrawal from the course. An explanation for absence from class may occasionally be secured from the Office of Student Services in advance of the expected absence. An approved absence may be warranted by:

1. participation in authorized university activities such as athletic events, dramatic productions, or debates;
2. medical problems supported by a record of treatment at Gannett Health Center or by another physician;
3. serious illness or death in the immediate family;
4. other circumstances beyond the student's control.

A request for explanation of an absence should, when possible, be made to the Office of Student Services before the date of expected absence. A reported and explained absence does not relieve a student from fulfillment of academic requirements during the period of absence. The course instructor has the authority to determine what work must be completed. The office can only confirm the explanation for absence. Students should inform the Office of Student Services of any problems they have meeting course requirements.

STANDING AND GRADES

Academic Integrity

In 1987 the faculty of the School of Industrial and Labor Relations approved a revised code of academic integrity. This code, while based on the Cornell University code, varies somewhat.

Absolute integrity is expected of all Cornell students in all academic undertakings. They must in no way misrepresent their work, fraudulently or unfairly advance their academic status, or be a party to another student's failure to maintain academic integrity. The code specifically prohibits:

1. knowingly representing the work of others as one's own;
2. using or obtaining unauthorized assistance in any academic work;
3. fabricating data in laboratory or field work;

4. giving fraudulent assistance to others;
5. fabricating data in support of laboratory or field work.

Full details on the applications of those prohibitions to course work, term papers, examinations, and other situations are listed in the code (cunfo.cornell.edu/Academic/AIC.html).

Dean's List

A Dean's List is compiled for each of the four undergraduate classes each semester following receipt of final grades from the registrar. Eligibility for the Dean's List is determined by applying all of the following criteria:

1. achievement of a semester average for freshmen of 3.3 or better; for sophomores of 3.4 or better; and for juniors and seniors of 3.6 or better;
2. a minimum course load for the semester of 12 letter-graded credits;
3. completion of all courses registered for at the beginning of the semester;
4. satisfaction of all good-standing requirements.

Academic Standing

Good standing requires that all of the following criteria be met at the end of each semester:

1. an average of C (2.0) for the semester's work, including a minimum of 8 completed and letter-graded credits;
2. no failing grades in any course, including physical education;
3. a cumulative average of C (2.0) for all completed semesters.

If at the end of any semester a student fails to maintain good standing, or if overall academic performance is so marginal as to endanger the possibility of meeting school and university degree requirements, his or her record is reviewed by the Committee on Academic Standards and Scholarships. The committee may issue a written warning to the student at that time. If a student who does not improve after the written warning, he or she may be placed on a required leave of absence for one or two semesters.

Involuntary Separation from the School for Academic Reasons

A student may be placed on a required leave of absence at the end of any semester when he or she has failed:

1. to establish good standing after a semester on warning;
2. to maintain an average of 2.0 in any semester after a previous record of warning;
3. to achieve good standing after being on warning any two previous semesters;
4. two or more classes in one semester or has a semester average of 1.0 or below.

The Academic Standards and Scholarships Committee may decide to permit a student to remain on warning more than one semester if there has been significant improvement even though the cumulative average is still below 2.0.

S-U Grading Policy

An undergraduate may register to receive a final grade of S (Satisfactory) or U (Unsatisfactory) in courses that offer this option—either in the school or in other divisions of the university—subject to the following conditions:

1. the S-U option may be used in ILR and in out-of-college course electives only, not in directed studies;
2. students are limited to registering in *two* S-U courses a semester;
3. S-U registration is limited to 4 credits for each course;
4. students registering for S-U grades must be in good standing;
5. students must fulfill the graduation requirement of 105 letter-graded credits.

ILR faculty members assign a grade of U for any grade below C- and a grade of S for any grade of C- or better. A grade of U is considered equal to an F in determining a student's academic standing, although it is not included in the cumulative average.

No change of grading (from letter to S-U or from S-U to letter) may be made after the first three weeks of class. There are no exceptions to this restriction, and appeals will not be accepted.

Grades of Incomplete

A grade of incomplete (INC) is assigned when a course has not been completed for reasons that are acceptable to the instructor. It is understood that the work will be completed later and credit given. Instructors may grant a grade of incomplete for a limited number of clearly valid reasons, but only to students with substantial equity in a course. A firm and definite agreement on the conditions under which the work may be made up must be made with the instructor. The school's policy allows a maximum of two full semesters of residence for removal of a grade of incomplete. If it is not made up within this time, the grade automatically becomes an F.

SPECIAL ACADEMIC PROGRAMS

To meet the special academic objectives of some students, the school's faculty has established several special academic programs. For additional information, students should contact a counselor in the Office of Student Services. Counselors will explore the program with students to help them decide if it suits their interests.

Five-Year Master of Science Degree Program

With early planning it is possible to earn the M.S. degree in a fifth year of study. This program is designed specifically for those who wish concentrated study in an area of specialization in the school for a master of science degree. Students considering this program should consult a counselor in the Office of Student Services after their freshman year.

Credit Internship Program

The ILR Credit Internship Program affords our advanced undergraduates (juniors and seniors) opportunities to enhance their understanding of the field of industrial and labor relations by

working for a semester (approximately 15 weeks) in one of the professional careers it encompasses. The Credit Internship Program operates both domestically and internationally, from Washington, D.C., New York City, and Los Angeles to Geneva, London, Kuala Lumpur, and Beijing, among many other locations. For more information, please visit ILR's Off-Campus Programs office in 381 Ives East and the ILR Credit Internship web site: www.ilr.cornell.edu/creditinternships. You are also welcome to send e-mail to Brigid Beachler, assistant director of off-campus credit programs, at bk30@cornell.edu.

Summer Internships

What is a summer internship? During the summer, a student who works in a job that is related to industrial and labor relations may find that the employer refers to that job as an internship. Their terminology differs from that used by ILR and Cornell to refer to credit-bearing internships. Academic credits earned: ILR considers an internship to be a learning experience engaged in during the academic year, for which students earn academic credit, are supervised by a faculty member, are evaluated, have a grade recorded, and pay tuition. With very few exceptions (the Clem Miller Scholarship, Saul Wallen internship, Chaim and Ida Miller Scholarship, all of which are summer support provided to selected ILR students) summer employment has little in common with the semester credit internship program. Approval is required in advance. Some companies tell students that they cannot be employed unless they receive academic credit for a summer internship. Cornell does not grant credit unless a student is registered, pays tuition, has a faculty supervisor, and is in a position approved for internship credit.

Programs in Washington

Interns work a minimum of 30 hours per week for the 15 weeks of the semester with approved organizations addressing issues of work and workplace relations. Students are also required to complete a comprehensive research project, related to their internship, that is graded by their ILR faculty supervisor. Students will also be required to take a 4-credit public policy course for ILR credit. Interns will receive a total of 16 ILR elective credits.

ILR/UCD Semester in Dublin Program

The ILR/UCD Semester in Dublin Program is the educational centerpiece of a comprehensive collaboration between the ILR School at Cornell University and the Quinn School of Business at University College Dublin. The program's purpose is to afford eligible ILR undergraduate students (juniors and seniors) opportunities to enhance their understanding of various international dimensions of the field of industrial and labor relations through courses taught by leading scholars at one of Europe's most vibrant and dynamic universities. The curriculum consists of three required courses: European Industrial Relations and Human Resource Management, Multinationals in the Global Economy, and Irish History and Culture. In addition, students will select one elective course related to the ILR field. Students will receive 12 ILR elective credits for the three ILR-related courses and three transfer credits for the Irish History and Culture course, for a total of 15 credits. For more information, please visit our web site:

www.ilr.cornell.edu/dublin, or contact Brigid Beachler, assistant director of off-campus credit programs, at bk30@cornell.edu.

Honors Program

Undergraduates who are ranked in the top 20 percent of their class at the end of the junior year may propose a two-semester research project, an honors thesis, for review by the Committee on Academic Standards and Scholarships. When approved, the candidate for graduation with honors works for two semesters (for 4 credits each semester) to research, write, and then defend the thesis.

Study Abroad

ILR students who plan to study in another country most often do so in the junior year, occasionally in the senior year. They may study in one of the programs that is sponsored by Cornell, in one sponsored by another institution and endorsed by Cornell, or in an approved externally sponsored program. Information about study abroad is available in OSS (101 Ives Hall) or the Cornell Abroad office (300 Caldwell Hall).

Students are expected to register for a full course load, the equivalent of 15 credit hours in a semester or 30 hours in a year, when they study abroad. Some courses will be the equivalent of general elective credit or distribution credit, but others may be accepted as ILR elective credit if evaluated and approved by the relevant ILR department chairs. A student may satisfy up to 9 hours of the ILR elective credit in a single semester abroad and up to 15 hours in a year of foreign study.

Application for foreign study requires that the student meet the Cornell deadlines as well as those specified by the program(s) of interest. Applications include tentative class schedules, recommendations from faculty members, approval of the application by an ILR faculty committee, essays, and transcripts. After being approved in ILR, the application is sent to the Cornell Abroad office and then to the program for which the student is applying. For more information, contact Kevin Harris, associate director of student services, 101 Ives Hall, 255-2223, kfh4@cornell.edu, or the Cornell Abroad office, 300 Caldwell Hall, 255-6224, CornellAbroad@cornell.edu, www.cuabroad.cornell.edu.

COLLECTIVE BARGAINING, LABOR LAW, AND LABOR HISTORY

I. DeVault, chair (340 Ives Hall, 255-3055); A. Colvin, M. Cook, J. Cowie, C. Daniel, R. Givan, M. Gold, K. Griffith, J. Gross, H. Katz, S. Kuruvilla, R. Lieberwitz, D. Lipsky, N. Salvatore, L. Turner

ILRCB 1100 Introduction to U.S. Labor History

Fall and spring. 3 credits. R. Applegate, J. Berger, J. Cowie, C. Daniel, I. DeVault, and N. Salvatore.

Introductory survey covering the major changes in the nature of work, the workforce, and the institutions involved in industrial relations from the late 19th century to the present.

ILRCB 1200 Introduction to Disability Studies

Fall. 2 credits. M. Gold.

A survey of the facts and issues that affect individuals with disabilities. Topics may include history of the treatment of disabilities; disability in literature; models of disability; disability in education, employment, health care, and the media; mental health and disability; accessible designs; and technologies for the disabled.

ILRCB 2010 Labor and Employment Law

Fall and spring. 3 credits. M. Gold,

J. Gross, K. Griffith, and R. Lieberwitz.

Survey and analysis of the law governing labor relations and employee rights in the workplace. The first half of the course examines the legal framework in which collective bargaining takes place, including union organizational campaigns, negotiations for and enforcement of collective bargaining agreements, and the use of economic pressure. The second half surveys the laws against discrimination based on race, religion, sex, national origin, age, and disability. Also serves as an introduction to judicial and administrative systems.

ILRCB 2050 Collective Bargaining

Fall and spring. 3 credits. A. Colvin,

R. Givan, R. Hurd, H. Katz, D. Lipsky,

R. Seeber, and L. Turner.

Comprehensive introduction to industrial relations and collective bargaining in the United States; the negotiation, scope, and day-to-day administration of contracts; the major substantive issues in bargaining, including their implication for public policy; industrial conflict; the major challenges facing unions and employers today; U.S. industrial relations in international and comparative perspective.

ILRCB 2060 Writing Seminar in Law

Fall or spring. 3 credits. Limited to 15

students. Fulfills sophomore writing

requirement. L. Adler, M. Gold, J. Gross,

K. Griffith, and R. Lieberwitz.

Topics change depending on semester and instructor.

ILRCB 2061 Citizenship, Race, and Class in 20th-Century America

Fall. 3 credits. Fulfills sophomore writing

requirement. J. Berger.

Explores the ways Americans have defined what it means to be a citizen of the United States. How have understandings of race and ethnicity influenced immigration policy and determined who can or cannot become a citizen? Why do some members of minority groups argue they historically have had only second-class citizenship? What types of benefits and rights should citizenship entail?

ILRCB 2063 Body, Mind, and Soul

Fall. 3 credits. Fulfills sophomore writing

requirement. J. Cowie.

Bruce Springsteen once said that Elvis Presley freed our bodies and Bob Dylan freed our minds. Ever since then, Springsteen has been working on our souls. This sophomore writing seminar will hone our analytical and writing skills by examining the historical context and artistic expressions of these three icons of the fifties, sixties, and seventies respectively. We will explore the roots of each artist's work in relationship to history, race, gender, class, postwar culture, politics, as well as each other. This writing seminar will require an intensive amount of reading, writing, and re-writing in

order to penetrate the complexities of these artists' contributions to American culture.

ILRCB 2070 Writing Seminar in History

Fall or spring. 3 credits. Limited to 15 students. Fulfills sophomore writing requirement. R. Applegate, J. Berger, J. Cowie, C. Daniel, I. DeVault, and N. Salvatore.

Topics change depending on semester and instructor.

ILRCB 2080 Writing Seminar in Collective Bargaining

Fall or spring. 3 credits. Limited to 15 students. Fulfills sophomore writing requirement. K. Bronfenbrenner, A. Colvin, R. Givan, J. Gross, R. Hurd, H. Katz, and D. Lipsky.

Topics change depending on semester and instructor.

ILRCB 2090 Work and Labor in the Global Economy

Spring. 3 credits. Limited to 20 students. Fulfills sophomore writing requirement. K. Bronfenbrenner.

Examines the evolution of American workplace in the past 20 years in the context of the global economy. Through a combination of nonfiction, fiction, workplace site visits, worker interviews, guest speakers, and weekly short writing assignments, students explore the changing nature of corporate structure, the workplace, the work process, and workers' lives in a range of occupations in five different sectors of the economy: IT, manufacturing, public sector, health care, and casual labor. Guest speakers include workers, union leaders, and employers from companies in the target sectors and site visits are made to both union and nonunion facilities. Particular emphasis is placed on exploring how work, workers, and communities have been impacted by globalization.

ILRCB 3010 Labor Union Administration

Fall. 4 credits. R. Hurd.

Study and analysis of the structure and operations of American unions, including the complicated internal life of the organizations; the varied environments in which unions develop and grow or decline; the relationship of national unions, local unions, and members in the context of internal union government; the ways in which unions are set up to handle organizing, collective bargaining, contract administration, and political activity; and the widespread movement toward merger and consolidation of unions. Examines the role of union leaders and the strategic choices they make. Attention is given to current developments in the labor movement and to the eternal problems of attaining union democracy.

ILRCB 3020 Strangers and Citizens: Immigration and Labor in U.S. History

Fall or spring. 4 credits. I. DeVault.

Explores immigrant workers' experiences in the 19th and 20th centuries from different perspectives. Students examine what it meant to the immigrants themselves to arrive as strangers in the United States while also examining the ways in which preexisting American groups defined these immigrants as "strangers." Similarly, students look at U.S. citizens in their roles as greeters of immigrants, detractors of immigrants, and as models for the aspirations of immigrants. The

main examples are taken from the industrial and union realms.

ILRCB 3030 Working-Class America in Mass Media and Popular Culture

Spring. 4 credits. J. Cowie.

Examines a variety of representations of working people found in commercial popular culture throughout the 20th century as a means to explore the ways in which history, memory, and politics are shaped through popular discourse. Uses sources as diverse as popular music, Hollywood movies, the mainstream press, and television sitcoms to understand the ideological and political influences on our pre-conceptions of workers, and how those forces influence our notions of authenticity, the historical experience, and the politics of social class.

ILRCB 3040 Special Topics: Labor History

Fall or spring. 4 credits. Prerequisite: permission of instructor. R. Applegate, J. Cowie, C. Daniel, I. DeVault, and N. Salvatore.

Undergraduate seminar whose topic changes depending on semester and instructor.

ILRCB 3042 Varieties of American Dissent, 1880-1990 (also AMST/HIST 3240)

Spring. 4 credits. N. Salvatore.

The idea of dissent in American society raises a variety of images. Civil rights activists, striking workers, and student radicals of the 1960s are familiar enough symbols of dissent. But might we understand a Pentecostal believer, filled with the spirit of his or her God in critiquing contemporary society, as an example of American dissent? This course explores the varieties of economic, political, and cultural dissent in American between 1880 and 1990, and examines how understanding dissent in its specific historical context illuminates major aspects of American life and culture.

ILRCB 3060 Recent History of American Workers: From the '60s through the '90s

Fall. 4 credits. J. Cowie.

Focuses on the social history of American workers and the role of organized labor in American life since the 1960s. Course themes often center on the complexities of social class in the United States. Topics include the transformations of liberalism, the civil rights and black power movements, the Vietnam War, the rise and fall of the New Left, industrial restructuring, the rise of neoconservatism, changes in civic identity, and sources of cultural conflict. Course ends with an examination of globalization, changes in the major political parties, the future of work, and prospects for social change.

ILRCB 3070 U.S. Business History: The Changing American Corporation

Spring. 4 credits. R. Applegate.

Surveys the changing organization of business firms in the United States since the Civil War, with a central focus on the historically dominant form of American business organization: the large industrial corporation. Course work covers the distinctive features and historical significance of the corporations known as "big business" by investigating the circumstances of their creation, successive phases of their organizational restructuring, the expanding reach of their managerial controls from firms to industries and markets,

and the enduring contest over their governance.

ILRCB 3071 Governing Economic Development: The U.S. Experience

Fall. 4 credits. R. Applegate.

Surveys the history of U.S. economic development from the perspective of the governance structures created to organize and control economic activity, emphasizing the changing regulatory roles of public and private institutions. Course work covers successive periods of economic development: a comparison of the "old liberal" governance regimes of the 19th century with the "new liberal" regimes created in the 20th century is followed by an investigation of the post-1970s contest between "neoliberal" and "neoprogressive" forms of economic regulation.

ILRCB 3072 Union Advocacy for Equality and Social Justice

Fall or spring. 2 credits. R. Hurd.

An exploration of the U.S. labor movement's relatively recent embrace of immigrant rights and support for the concerns of lesbian, gay, bisexual, and transgender workers. Also a review of labor's longer-term involvement in the women's rights and the civil rights movements. Attention to the role of labor constituency groups including Coalition of Labor Union Women, Asian Pacific American Labor Alliance, A. Phillip Randolph Institute, Coalition of Black Trade Unionists, Labor Council for Latin American Advancement, and Pride at Work. Also individual union political advocacy and targeted bargaining innovations related to equality and social justice.

ILRCB 3830 Workers' Rights as Human Rights

Fall or spring. 4 credits. J. Gross.

Examines U.S. domestic labor law and policy using internationally accepted human rights principles as standards for judgment. Considers the idea of human rights, its philosophical and moral origins, and introduces the legal and social obligations of both governments and nonstate actors to respect the human rights of workers. Topics include the Universal Declaration on Human Rights, ILO International Labor Standards, the Declaration on Fundamental Principles and Rights at Work, workers' freedom of association and the right to organize and collectively bargain, occupational health and safety, discrimination, forced labor, child labor, migrant labor, labor rights defined in international trade agreements, the value judgments underlying labor policy choices, and the struggle for enforcement of human rights standards nationally and internationally. The course examines these topics in an internationally comparative context and includes presentations and discussions from international experts on various human rights issues.

ILRCB 3850 African American Social History, 1865 to 1910: The Rural and Urban Experience

Fall. 4 credits. N. Salvatore.

Examines the experience of black Americans from Emancipation through the experience of the first generation born after slavery. Topics include the changing nature of work; political organization and the rise of Jim Crow; protest, accommodation, and separatism; and the continued evolution of black social and cultural expression after slavery.

ILRCB 3860 African American Social History, 1910 to the Present: Race, Work, and the City

Spring. 4 credits. N. Salvatore.

Examines the experience of black Americans from the start of the Great Migration just before World War I. Topics include the effects of migration on work experiences and unionization patterns, the impact of depression and two world wars on black social structure and economic status, the growth of the Civil Rights movement, and the impact of migration and urbanization on a variety of social and cultural institutions.

ILRCB 3880 Unfree Labor: Servants, Slaves, and Wives

Spring. 4 credits. I. DeVault.

Examines various forms of unfree labor, mostly in the antebellum (pre-Civil War) era in the United States. Will look at the situation of indentured servants and apprentices, African slaves, and wives of all social classes, reading both autobiographical and historical studies. Will also discuss the contrasts and interrelationships among these different groups of early American workers.

ILRCB 4000 Union Organizing

Spring. 4 credits. Prerequisites: ILRCB

2010/5010, 2050/5000. K. Bronfenbrenner.

Examines the theory, practice, and strategy of organizing in a global economy. Addresses current challenges facing unions organizing in both the public and private sector, in certification elections and card check campaigns. Topics include review of organizing theory, the social and political context of current organizing, the debate on organizing policy and labor law reform, worker attitudes toward organizing, changing employer strategies and tactics, staffing and financing organizing campaigns, strategic targeting, organizing styles and tactics, changing demographics of newly organized workers, organizing outside the labor board process, and the limits and possibilities of organizing on a global scale.

ILRCB 4020 Migrant Workers (also HIST/LATA/LSP 4310)

Spring. 3 credits. R. Craib.

For description, see LSP 4310.

ILRCB 4030 The Economics of Collective Bargaining in Sports

Fall or spring. 4 credits. L. Kahn.

Surveys economic and industrial issues in the sports industry. Topics include salary determination, including free agency, salary caps, salary arbitration; competitive balance and financial health of sports leagues; antitrust issues in sports; labor disputes, union history, and contract administration issues in sports leagues; discrimination in sports; and performance incentives.

ILRCB 4040 Contract Administration

Fall. 4 credits. Prerequisites: ILRCB

2010/5010, 2050/5000. K. Bronfenbrenner.

Focuses on the practice, nature, and challenges of union representation under collective bargaining agreements. Working with union contracts, constitutions, and by-laws from a diversity of national and local public and private sector agreements, the course examines how U.S. unions represent their members in different industries and different collective bargaining environments. Issues addressed include union representative/steward rights and responsibilities, contract enforcement structures and practice, access to

information, new work systems, hours of work and scheduling, contingent staffing arrangements, workplace discrimination, health and safety, promotional opportunities, downsizing, leadership development, membership involvement and commitment, internal organizing, community coalition building, and decertification campaigns. Students practice hands-on work in interpreting contract language and preparing and presenting grievances and unfair labor practices.

ILRCB 4050 Employment Law I

Fall. 4 credits. Prerequisites: ILRCB 2010, 5010, or permission of instructor.

Attendance and participation mandatory.

May be taken either before or after ILRCB 4051. L. Adler.

Takes a similar approach to ILRCB 4051, but the subject matter differs. Topics include employment at will and its exceptions; the role of the Constitution in the U.S. workplace; the law of electronic and traditional privacy at work; and the slowly evolving rights of contingent workers in the old and new economies. One study reviews primarily federal and state court decisions and focuses upon the way that employees' rights are advanced or constricted by law. There are considerable reading responsibilities.

ILRCB 4051 Employment Law II

Spring. 4 credits. Prerequisites: ILRCB 2010, 5010, or permission of instructor.

Attendance and class participation mandatory. May be taken either before or after ILRCB 4050. L. Adler.

Takes a similar approach to ILRCB 4050, but the subject matter differs. Topics include the meaning and validity of preemployment arbitration agreements; the critical distinctions in the status and thus the rights of employees, independent contractors, and contingent workers; what rights the working poor, the homeless, and welfare individuals have on the "job;" and the origin and application of the workers' compensation laws that apply when people are injured or contract disease from their work. One study reviews primarily federal and state court decisions and focuses on the way that employees' rights are advanced or constricted by the law. There are considerable reading responsibilities.

ILRCB 4060 Hospitality Industry Labor Relations (also HADM 4481)

Spring. 4 credits. R. Hurd and D. Sherwyn.

Critical labor relations issues facing the hospitality industry. The impact of the structure and performance of the industry on the collective bargaining environment. Labor relations strategy of UNITE-HERE, the key union representing hospitality industry workers. Labor relations strategies of selected hospitality industry corporations. Labor-management partnerships. Neutrality, union organizing, and the expanding reach of hospitality industry labor relations. All students will participate in simulated organizing campaigns and contract negotiations. Representatives of management and unions will address the class on key contemporary developments.

ILRCB 4070 Contemporary Trade Union Movement

Spring. 4 credits. Prerequisites:

undergraduates, ILRCB 1100; graduate students, ILRCB 5020. R. Hurd.

Examination of contemporary trade union issues, including union power, political action,

collective bargaining approaches, and organizing efforts. Covers structural, functional, and strategic aspects of contemporary unions. Speakers from the union movement address the class.

ILRCB 4820 Ethics at Work

Fall or spring. 4 credits. Prerequisite: junior or senior standing or permission of instructor. M. Gold.

Examines major theories of ethics, then applies them to issues in the employment relationship such as genetic screening of job applicants, random drug testing of employees, affirmative action, discipline for off-duty conduct, whistle-blowing, worker safety and cost/benefit analysis, comparable worth, strikes by employees providing crucial services, and crossing a picket line.

ILRCB 4860 Collective Bargaining in Public Sector

Fall or spring. 4 credits. Prerequisites:

ILRCB 2010 and 2050/5000. L. Adler.

Examines the history of public employees' collective bargaining and other workplace rights. Emphasis is placed on the current trade-offs between municipal and state governments and their unionized employees in New York City and state, although trends in other states, the federal sector, and in certain EU countries are also examined. Topics include representation rights, public sector workers ability to leverage their power, unfair labor practices, impasse procedures, the scope of collective bargaining, and a limited treatment of the U.S. constitution in the public workplace. Examination of the development, practice, and extent of collective bargaining between federal, state, and local governments and their employees. Throughout, we are mindful of how the exercise of public employee rights impacts municipal, state, and federal public policy labor market considerations. There are several prominent guest speakers.

ILRCB 4880 Liberty and Justice for All

Fall or spring. 4 credits. Prerequisite: junior or senior standing or permission of instructor. M. Gold.

Examines major theories of ethics, then applies them to contemporary issues such as affirmative action and reverse discrimination, the right to life (from abortion to capital punishment), comparable worth, and constitutional rights such as freedom of speech.

ILRCB 4950 Honors Program

Fall and spring (yearlong). 4 credits each

semester. Students are eligible for ILR senior honors program if they (1) are in upper 20 percent of their class at end of junior year; (2) propose an honors project, entailing research leading to completion of a thesis, to an ILR faculty member who agrees to act as thesis supervisor; and (3) submit project, endorsed by proposed faculty sponsor, to Committee on Academic Standards and Scholarships.

Accepted students embark on a two-semester sequence. The first semester consists of determining a research design, familiarization with germane scholarly literature, and preliminary data collection. The second semester involves completion of the data collection and preparation of the honors thesis. At the end of the second semester, the candidate is examined orally on the completed thesis by a committee consisting of the thesis supervisor, a second faculty member designated by the appropriate department

chair, and a representative of the Academic Standards and Scholarship Committee.

ILRCB 4970-4980 Field Research, Internship

Fall and spring. 4970, 4 credits; 4980, 8 credits. Staff.

All requests for permission to register for an internship must be approved by the faculty member who will supervise the project and the chairman of the faculty member's academic department before submission for approval by the director of off-campus credit programs. Upon approval of the internship, the Office of Student Services will register each student for 4970, for 4 credits graded A+ to F for individual research, and for 4980, for 8 credits graded S-U, for completion of a professionally appropriate learning experience, which is graded by the faculty sponsor.

ILRCB 4990 Directed Studies

Fall and spring. 4 credits. Staff.

For individual or group research projects conducted under the direction of a member of the ILR faculty, in a special area of labor relations not covered by regular course offerings. Sophomores, juniors, and seniors with a preceding semester of 3.0 semester average are eligible to submit projects for approval by the Academic Standards Committee. Students should consult with a counselor in the Office of Student Services at the time of CourseEnroll to arrange for formal submission of their directed study.

ILRCB 5000 Collective Bargaining

Fall. 3 credits. Prerequisite: graduate standing. Recommended: previous or concurrent enrollment in ILRCB 5010. A. Colvin, H. Katz, and S. Kuruvilla.

Comprehensive introduction to the industrial relations system of the United States. Covers the negotiation, scope, and day-to-day administration of contracts; union and employer bargaining structures; implications of industrial relations issues for U.S. competitiveness and public policy; industrial conflict; and U.S. industrial relations in international and comparative perspective.

ILRCB 5005 Employee Benefits: Law, Policy, and Practice

Fall, seven-week course, 2 credits. L. Compa.

Offers a general overview of the basics of ERISA, retirement plans, and health insurance, with some additional treatment of other employee benefits such as sick leave, parental leave, and child care. We will examine these issues in (1) a policy context, since health insurance and pension protection will be at the top of the national policy agenda with a new administration and congress in Washington; and (2) a collective bargaining context, since bargaining over employee benefits present sharp challenges to employer and union negotiators.

ILRCB 5010 Labor and Employment Law

Fall. 3 credits. Prerequisite: graduate standing. A. Colvin, L. Compa, M. Gold, K. Griffith, and R. Lieberwitz.

Survey and analysis of the law governing labor relations and employee rights in the workplace. The first half of the course examines the legal framework in which collective bargaining takes place, including union organizational campaigns, negotiations for and enforcement of collective bargaining agreements, and the use of economic pressure. The second half surveys additional

issues of rights in employment, including such topics as employment discrimination, the developing law of "unjust dismissal," and union democracy. Also serves as an introduction to judicial and administrative systems.

ILRCB 5020 History of Industrial Relations in the United States since 1865

Fall or spring. 3 credits. Prerequisite: graduate standing. J. Cowie, C. Daniel, I. DeVault, and N. Salvatore.

Introductory survey course emphasizing historical developments in the 20th century. Special studies include labor union struggles over organizational alternatives and such other topics as industrial conflicts, working-class lifestyles, radicalism, welfare capitalism, union democracy, and the expanding authority of the federal government.

ILRCB 5040 The U.S. Industrial Relations System

4 credits. Offered only in New York City for M.P.S. program. Staff.

Examines the development, operation, and outcomes of the U.S. industrial relations system in a comparative context. Specifically, the course contrasts the American experience with industrial relations institutions and outcomes with the experience of several other countries in Europe and Asia. Students look at the process of union formation, the practice of collective bargaining at different levels, the methods of dispute resolution, and the legal regime germane to industrial relations. The course also focuses on both processes and outcomes of different country systems, focusing on the degree of collaboration or conflict, wage levels and wage inequality, and practices in different industries and firms. Finally the role played by industrial relations and human resource policy in economic and social development in these nations is addressed.

ILRCB 6000 Special Topics: Labor Law

Fall or spring. 4 credits. Prerequisite: permission of instructor. Open to graduate students and upper-division undergraduates. Sem. A. Colvin, L. Compa, M. Gold, K. Griffith, and R. Lieberwitz.

Topic changes depending on semester and instructor.

ILRCB 6011 Negotiation: Theory and Practice

Fall or spring. 4 credits. Prerequisites: background in economics and social sciences, or permission of instructor. D. Lipsky and R. Seeber.

Deals with negotiation and bargaining, focusing on process, practice, and procedures. Concentrates on the use of negotiation and bargaining to resolve conflicts and disputes between organizations and groups. Discusses various theories of negotiation, including conventional, "positional" bargaining, interest-based bargaining, the use of power in negotiation, and game theoretic approaches to bargaining. Examples, cases, and exercises are used to illustrate general principles. This is a generic negotiation course and thus does not deal with labor relations nor does it focus on any particular type of negotiation. Rather, it examines negotiation and bargaining generally, using examples drawn from several contexts, including employment relations, environmental disputes, real estate transactions, and other settings.

ILRCB 6012 Managing and Resolving Conflict

Fall or spring. 4 credits. Prerequisite: background in economics and social sciences or permission of instructor. A. Colvin, D. Lipsky, and R. Seeber.

Deals with managing and resolving workplace conflicts and examines dispute resolution and conflict management in both union and nonunion settings. The course covers two related topics: (1) Third-party dispute resolution, including alternative dispute resolution (ADR). This part focuses primarily on the use of mediation and arbitration but also deals with other dispute resolution techniques, such as fact-finding, facilitation, peer review, and the ombuds function; (2) Conflict management in organizations, including the recent development of conflict management systems. The course reviews the factors that have caused the growth of ADR and conflict management systems, and it provides instruction on the design, implementation, and evaluation of such systems.

ILRCB 6014 Industrial Relations in Transition

Spring. 4 credits. Prerequisite: senior or graduate standing. H. Katz.

Considers whether recent developments such as concession bargaining, worker participation programs, and the growth of nonunion firms represent a fundamental transformation in industrial relations practice. Reviews recent research and new theories arguing that such a transformation is occurring, including the work of Piore and Sabel, Bluestone and Harrison, and Kochan, McKersie, and Katz. Also reviews the counterarguments and evidence put forth by those who believe no such transformation is under way. Course material focuses on industrial relations practice in the private sector in the United States, although some attention is paid to developments in Western Europe, the United Kingdom, and Japan.

ILRCB 6018 Current Issues in Collective Bargaining: Theory and Practice

Spring. 4 credits. K. Bronfenbrenner.

Examines the theory and practice of the collective bargaining process in the past three decades. This will be achieved both through a review of recent literature on bargaining theory and through the analysis and evaluation of a series of collective bargaining campaigns from a variety of industries, unions, strategic models, and outcomes both in the United States and around the world, starting with the Phelps Dodge Strike in 1982 and ending with recent contract campaigns with large transnational firms, which students will research and write about as their final paper. Subjects addressed will include changing bargaining climate, bargaining theory, variations in bargaining structures and practices, union and company power analysis, role of membership in bargaining, interest-based bargaining, bargaining with transnational firms, comprehensive and cross-border campaigns, strikes and lockouts, community labor coalitions, bargaining in an era of global economic crisis, and bankruptcy and bargaining.

ILRCB 6019 Dispute Resolution Practicum

Spring. 2 credits. Limited to 20 students. D. Lipsky, R. Seeber, and R. Scanza.

Purpose is to link classroom discussion and analysis of arbitration and mediation with opportunities for students to observe actual arbitration and mediation cases. The course is designed to be an advanced seminar for graduate and undergraduate students who have a serious interest in pursuing a career in arbitration or mediation. Classroom discussions and readings will focus on both labor arbitration and mediation (i.e., the use of arbitration and mediation in unionized settings) and employment arbitration and mediation (i.e., the use of arbitration and mediation in cases involving nonunion employees).

ILRCB 6020 Arbitration

Fall and spring. 4 credits. Limited to 21 students. Prerequisites: ILRCB 2010, 2050, 5000, and 5010. A. Colvin, J. Gross, and R. Lieberwitz.

Study of arbitration in the field of labor-management relations, including an analysis of principles and practices, the law of arbitration, the handling of materials in briefs or oral presentation, the conduct of a mock arbitration hearing, and the preparation of arbitration opinions and post-hearing briefs.

ILRCB 6040 Theories of Equality and Their Application in the Workplace

Spring. 4 credits. R. Lieberwitz.

An examination of the various aspects of equality in the workplace, focusing most closely on issues of race, gender, and national origin and the ways in which societal discrimination on these bases are institutionalized in the workplace. Theories attempting to define "equality" and specific workplace issues are studied, including the means for achieving equality at the workplace. The course entails research and writing assignments and a high level of student participation in class discussions.

ILRCB 6060 Theories of Industrial Relations Systems

Fall or spring. 4 credits. Prerequisite: senior or graduate standing; ILRCB 1100, 2050, 5000. H. Katz.

Traces the evolution of theory and research on industrial relations. Topics include theories of the labor movement; institutional models and evidence regarding what unions do; the origins of internal labor markets and their relationship with unionization; models of strikes; empirical assessments of arbitration; research on union decline; and empirical evidence of the impacts of new technology.

ILRCB 6070 Values in Law, Economics, and Industrial Relations

Fall and spring. 4 credits. Limited to 21 students. Prerequisites: ILRCB 2010, 2050, 5000, 5010. J. Gross.

Examination of the often hidden values and assumptions that underlie the contemporary U.S. systems of employment law, work and business, and industrial relations. Classroom discussions and student research projects use novels and short stories (as well as the literature of industrial and labor relations) to focus on issues such as discrimination; law, economics, and the state; work and business; power, conflict, and protest; and rights and justice.

ILRCB 6079 Low-wage Workers and the Law

Spring. 4 credits. Prerequisite: ILRCB 2010 or permission of instructor. K. Griffith.

Examines labor and employment law as it affects low-wage (including documented and

undocumented immigrant) workers. It will cover traditional labor and employment law statutes as well as new developments in labor and employment law that affect low-wage workers. Much of the course will be dedicated to federal legislation and case law related to the above. The course will also cover the overlap between labor and employment law and low-wage and immigrant worker organizing efforts.

ILRCB 6080 Special Topics in CB, LL, and L History

Fall or spring. 4 credits. Staff.

Topics change depending on semester and instructor.

ILRCB 6081 Public Policy and Public Sector Employment Relations

Fall. 4 credits. Prerequisites: ILRCB 2010/5010 or permission of instructor.

L. Adler.

Examine legal and other public employment conflicts created by taxation, education, fiscal failings, and labor/management problems. Our understanding will be informed by assessing the conflict resolution value of litigation, interest-based bargaining, traditional collective bargaining, and alternative dispute resolution mechanisms. Journal review, legal cases, and policy readings related to current, critical challenges to the public employment relationship will comprise our traditional study. As important will be field trip work with dispute resolution professionals, litigators, and collective bargaining practitioners. In addition to assigned readings, class participation, and an encouraged modest externship, there will be one examination and one or more significant writing assignments.

ILRCB 6082 Collective Bargaining Simulation

Fall. 4 credits. Limited to 18 students.

Prerequisite: junior, senior, or graduate standing.

Recommended: previous or concurrent enrollment in collective bargaining theory and labor law course. Attendance at first class mandatory. Up to two required evening extended bargaining sessions. H. Kramer.

Students prepare for and participate in a simulated negotiation between a hypothetical corporation and a hypothetical union in a typical big company with mid-size single site bargaining unit context. Students are assigned, usually in line with preferences, to either a management or union bargaining team. The course stresses the negotiation process over settlement or substantive outcomes.

Negotiation problems are as real life as possible, constrained by student time needs and with attention given to dynamic legal, political, economic, and communications concerns as well as power, information, and time factors. Participants plan for negotiations, reach agreements in principle and negotiate language, bargain wages, pensions, health care and noneconomic items in the context of a company and union with an established contract, policies, and culture. This is a hands-on program with active participation essential.

ILRCB 6830 Research Seminar in the History of Industrial Relations

Fall or spring. 4 credits. Prerequisites:

ILRCB 1100, 5020. J. Cowie, C. Daniel, I. DeVault, and N. Salvatore.

Areas of study are determined each semester by the instructor offering the seminar.

ILRCB 6840 Employment Discrimination and the Law

Fall or spring. 4 credits. Prerequisite: ILRCB 2010/5010 or equivalent. M. Gold, K. Griffith, and R. Lieberwitz.

Examines the laws against employment discrimination based on race, color, religion, sex, national origin, age, and disability.

ILRCB 6870 Introduction to Labor Research

Spring. 4 credits. Limited to 20 students.

K. Bronfenbrenner.

Designed to provide students interested in the labor field with the skills necessary to understand and use social science research as it relates to the labor movement. The course's four major goals are to (1) develop the skills to critically evaluate a wide variety of research relating to unions and the workplace; (2) introduce a number of both quantitative and qualitative research techniques used by unions and those who study the labor movement; (3) familiarize students with the broad range of library and computer resources that can be used for labor and corporate research; and (4) provide students with an opportunity to design and conduct a research project for a national or local union.

ILRCB 6890 Constitutional Aspects of Labor Law

Fall or spring. 4 credits. R. Lieberwitz.

In-depth analysis of the Supreme Court decisions that interpret the United States Constitution as it applies in the workplace. Focuses on the First Amendment, Fifth Amendment, Fourteenth Amendment, and Commerce Clause, with issues including freedom of speech and association, equal protection, due process, and other issues in the area of political and civil rights. The course entails a high level of student participation in class discussion, and assignments include a research paper.

ILRCB 7030 Qualitative Research Methods in Industrial Relations and Human Resources

Spring. 4 credits. Prerequisite: M.S. and Ph.D. students; ILRCB 5000.

Recommended: statistics course beyond level of ILRST 5100. S. Kuruvilla.

Advanced doctoral seminar that focuses on the philosophy of inquiry, generally, as well as the various paradigms governing research on work. The course further focuses on selected qualitative research methods used in research in industrial relations, human resource management, and organizational behavior.

ILRCB 7050 The Economics of Collective Bargaining

Spring. 3 credits. Prerequisites: ILRCB 5000, ILRLE 5400 or equivalents and an understanding of multiple regression analysis; or permission of instructor. Staff.

Focuses on both the economic analysis of unions and collective bargaining in our economy and the economic forces that affect collective bargaining. The method is to identify and conceptualize the structural determinants of relative bargaining power. On this basis, the course examines both the economic outcomes of collective bargaining and current bargaining trends in a variety of industries. Tentative theoretical analyses of unionism (neoclassical, institutionalist) are compared. The statistical techniques and empirical results of research on the union effect on economic outcomes (wages, prices, inflation, profits, productivity, earnings

inequality) are also evaluated. The effect of technology, corporate structures, and public policy on union bargaining power is outlined, and a number of case studies of collective bargaining in the private sector are reviewed. A term paper is required.

ILRCB 7070 Seminar on Conflict and Dispute Resolution

Fall. 3 credits. A. Colvin.

Examines past and present research on conflict and dispute resolution. This seminar will cover a variety of perspectives on conflict and its resolution. Readings will include a mixture of classic works on conflict and dispute resolution in work and employment relations, as well as recent conceptual and empirical studies in this area.

ILRCB 7080 Negotiations in Practice

Fall. 3 credits. S. Kuruvilla.

Provides opportunities for students to develop their negotiating abilities for use in organizational and other settings. The course is premised on the assumption that negotiating concepts are best learned through practice that is grounded in rigorous analysis and reflection. While theoretical principles and concepts from various reference disciplines (e.g., social psychology, sociology, and economics) are presented through lectures and readings, this course focuses primarily on improving practical skills. Participants learn not only to enhance their individual abilities in dyadic and group situations but also to analyze contexts for the most effective application of these skills.

ILRCB 7081 Seminar in American Labor History (also HIST 6830)

Fall or spring. 3 credits. Prerequisite: graduate standing and permission of instructor. J. Cowie, I. De Vault, and N. Salvatore.

Topics change depending on semester and instructor.

ILRCB 7900 ILR M.P.S. Program

Fall and spring. 1-9 credits. Staff.

Supervised research only for those enrolled in the ILR M.P.S. program.

ILRCB 7980 Internship

Fall and spring. 1-3 credits.

Designed to grant credit for individual research under direction of a faculty member by graduate students who have been selected for an internship. All requests for permission to register for ILRCB 7980 must be approved by the faculty member who will supervise the project.

ILRCB 7990 Directed Studies

Fall and spring. Credit TBA.

For individual research conducted under the direction of a member of the faculty.

ILRCB 9800 Workshop in Collective Bargaining, Labor Law, and Labor History

Fall and spring. 2 credits. Prerequisite: M.S. and Ph.D. candidates in department. S-U grades only. Staff.

Provides a forum for the presentation of current research being undertaken by faculty members and graduate students in the Department of Collective Bargaining, Labor Law, and Labor History, and by invited guests. All M.S. and Ph.D. candidates in the department who are at work on their theses are strongly urged to enroll. Each student is expected to make at least one presentation during the year, focusing on the formulation,

design, execution, and results of his or her thesis research.

HUMAN RESOURCE STUDIES

L. Dyer, chair (387 Ives Hall, 255-8805); R. Batt, B. Bell, J. Bishop, D. Burton, D. Cohen, C. Collins, L. Dragoni, L. Gasser, J. Grasso, K. Hallock, J. Hausknecht, R. Hewerston, C. Homrighouse, R. Kehoe, B. Livingston, L. Nishii, C. Tharp, C. Warzinski, W. Wasmuth, P. Wright

ILRHR 2600 Human Resource Management

Fall and spring. 3 credits. Prerequisite: ILR students or permission of instructor. Staff. Intended to introduce students to the field of human resource management (HRM). Students learn theories and applications involved in effectively managing people in organizations. In addition, this course covers current topics in HRM that have resulted from environmental and organizational challenges, e.g., technology, globalization, legislation, restructuring, work/life balance, changing labor markets, and so on. Emphasis is placed on developing relevant problem solving and critical thinking skills, as the basic concepts of HRM and the skills developed in this course are applicable to all types of organizations and jobs in which students will eventually work.

ILRHR 2660 Essential Desktop Applications

Fall, spring, and summer. 2 credits. Limited enrollment. C. Homrighouse.

Provides skills in the use of personal computers that run the Windows operating system. Covers the basics and time-saving techniques for Windows, Lexis Nexis, and Microsoft Excel, Access, and PowerPoint. Emphasizes hands-on experience and development of PC-based solutions by using examples that address human resource and other practical real-world issues. The skills developed in this course are useful prerequisites for several elective courses in human resource management and essential in the 21st-century workplace.

ILRHR 2680 Job Loss

Fall. 3 credits. Sophomore writing course. Limited to 15 students. K. Hallock.

Students will gain an understanding of the effects of layoffs on firms, from an interdisciplinary perspective. By the end of the course you should know quite a bit about the who, what, where, when, and why of layoffs and you should understand the effects of the layoffs on firms. Readings from economics, sociology, political science, psychology, finance, industrial relations, and human-resource management. Will include discussion of recent theory and research. However, the strong focus of the course will be on applications and on writing. Issues we will consider include: federal and state legislation and public policy, how layoffs actually occur—the procedures used by human resource managers in implementing layoffs, reasons for layoffs, types of workers involved in layoffs, timing of layoffs, layoffs and managerial outcomes (such as compensation and managerial turnover), layoffs and firm performance in the short run, layoffs and firm performance in the long run, case studies, and suggestions for policy. Occasional speakers will join the class: for example, Louis Uchitelle

from the *New York Times* has agreed to speak about writing and his work on layoffs.

ILRHR 2690 Cross-Cultural Perspectives on Work

Spring. 4 credits. Writing course.

Prerequisite: ILRHR 2600 or equivalent.

L. Nishii.

Most management theories have been developed and tested by Western scholars, based on Western cultural assumptions regarding the bases of human cognition, motivation, and emotion. Yet the vast majority of the world's population is non-Western and lives accordingly, based on different cultural assumptions. Students will begin by learning about theories of cultural variation, then will learn about the implications of these cross-cultural differences for basic HR and OB concepts.

ILRHR 3600 Human Resource Economics and Public Policy

Spring. 4 credits. Prerequisite: sophomore, junior, or senior standing. J. Bishop.

State and local efforts to improve K-12 education are employing a variety of (sometimes contradictory) reform strategies. This course critically examines the case that is made for (and against) each of the major reform proposals and review studies that provide objective evidence on their effectiveness. The education reform strategies examined include vouchers, charter schools, small schools, career academies, extending the school day and year, better preparation and selection of new teachers, better professional development, ending tenure, merit pay, state standards and school accountability, ending social promotion, and externally set end-of-course examinations.

ILRHR 3620 Career Development: Theory and Practice

Fall, spring, seven weeks. 2 credits. Limited to 30 students. S-U grades only. L. Gasser.

Covers the components of career management, individual factors, and organizational realities in the development of both careers and organized programs for career management. Two complementary learning tasks are required: information-gathering for career decision making based on self-assessment activities, and comprehension of organizational circumstances and practices encountered as careers develop. Grades are based on short writing assignments and a research paper.

ILRHR 3650 Organizational Consulting: Process and Results

Fall. 4 credits. Prerequisite: ILRHR 2600 or equivalent. R. B. Hewerston.

Provides students with the insights and tools they need to work successfully as human resource generalists who consult with operating managers to improve organizational effectiveness. The consulting process is examined from both an interpersonal and systems perspective. This includes the knowledge and skills required to build trust and influence, contract with clients, and maintain good working relationships with clients. It also includes developing a clear comprehension of the consulting process from diagnosis, through action planning, to implementation and completion. While attention is given to theory and practice, the focus is on gaining hands-on experience dealing with real-world issues. As a final project, students design and present consulting plans based on actual case

situations (e.g., implementing a new HR program, effectuating a new organizational culture, and enhancing project team operations).

ILRHR 3670 Employee Training and Development

Fall. 4 credits. Prerequisite: ILRHR 2600; undergraduate standing. B. Bell and L. Dragoni.

Faced with increasing competition, globalization, technological complexities, and dynamic labor markets, firms increasingly are struggling to determine the best approaches to training and developing their workforces. This course introduces the issues, concepts, and processes with which firms are wrestling, as well as specifics on planning, designing, implementing, and evaluating training and development programs. After completing this course, participants should be able to conduct a needs assessment, evaluate employee readiness, evaluate the strengths and weaknesses of various training and development techniques, solve transfer of learning problems, and design evaluation procedures.

ILRHR 4600 International Human Resource Management

Fall. 4 credits. Prerequisite: ILRHR 2600 or equivalent. L. Nishii.

Illustrates how cultural context affects the structure and implementation of HR practices. The first part focuses on comparative human resource management or the study of how HRM differs across cultures, with a primary emphasis on comparing American HRM practices with those in East Asia and a secondary focus on Western European HRM practices. Class readings and discussions are grounded in theories of cultural variation. The second part focuses on IHRM, or the HRM issues facing multinational corporations. Topics include expatriation and repatriation, global leadership, compensation, and training.

ILRHR 4610 Working in the New Economy: The Sociology of Work

Spring. 4 credits. Prerequisite: undergraduate standing. R. Batt.

Seminar that draws on qualitative studies of the workplace in the United States and abroad to examine how workers and managers are affected by changes in globalization technologies, business strategies, labor markets, and other factors. What dilemmas and conflicts emerge, how are they managed, and what are their outcomes? Readings cover firsthand accounts of people's experiences in a wide range of occupations and industries, including professional, service, and factory workers.

ILRHR 4620 Staffing Organizations

Spring. 4 credits. Prerequisite: undergraduate standing. C. Collins, J. Hausknecht, and B. Livingston.

Seminar designed to provide an overview of the processes by which organizations staff positions with both internal and external applicants. Through a combination of lectures, cases, and projects, the course covers theory, research, and legal foundations that inform organizational staffing actions. Topics include staffing strategy and context, measurement of staffing effectiveness, job/competency analysis, human resource planning, recruitment and job choice, retention, and internal and external selection practices.

ILRHR 4631 Managing Compensation

Spring. 4 credits. Prerequisite: ILRHR 2600 or equivalent; undergraduate standing. C. Tharp.

Compensation, including direct wages, indirect payments, and employee benefits, is studied from the points of view of theory and practice. Upon completion of the course, students should be able to analyze wage surveys, evaluate jobs, create salary structures, and administer compensation programs within the context of sound economic and motivational theory, and to align rewards with business strategy. Topics include strategic perspectives on pay; internal equity and alignment; external competitiveness; pay for performance; compensating special groups (including unionized employees, executives, and boards of directors); international compensation; employee benefits; and compensation administration (costing, taxation, regulation, etc.).

ILRHR 4632 Finance for Human Resources

Fall. 4 credits. J. Grasso.

Provides students with basic concepts of financial management and analysis, with an emphasis on human resource applications. The course begins with understanding financial statements; the financial structure of the firm; evaluation of financial performance; cash flow; and time value of money. It then focuses on investment management and performance with a broad overview of debt, equity, and alternative investments and a review of capital markets. The case-study method is used to evaluate several financial market disruptions during the past decade. The HR portion of the course focuses on valuing pension obligations; stock options and executive pay; costing labor agreements; costing health care and other benefits; preparing a compensation budget; and understanding IRS Form 5500; etc. The course also reviews corporate proxies; governance; social responsibility and corporate transparency, ethics, and fraud; and SEC, FASB, IRS, and Sarbanes-Oxley requirements. Students are required to follow one company stock, industry, or topic throughout the course; write a paper; and work in groups on small projects.

ILRHR 4640 Business Strategy

Fall. 4 credits. Prerequisite: undergraduate standing. D. Cohen.

Integrative course focusing on strategic management. The main purpose is to provide an opportunity for students to study and analyze issues associated with strategic thinking in complex business situations, top management decision making, and the functions of corporations as a whole. Allows students to bring together all of the functional skills they have learned in other business or related classes (e.g., marketing, accounting, finance, human resources) and to apply this knowledge to business problems faced by top management in existing organizations. Class format includes lectures and case studies.

ILRHR 4641 Business Strategy, Organizational Design, and Human Resource Strategy

Fall. 4 credits. Prerequisite: ILRHR 2600 or equivalent. R. Kehoe.

Explores ways in which the effective use of human capital contributes to organizational success. Specifically, it provides insights into and practice using the processes firms employ to attain and maintain alignment among the

three key elements involved in this endeavor: business strategies, organizational designs, and human resource strategies. Lectures and discussion are used to promote a clear understanding of the theory, research, and experience that underlie the role of human capital in organizations, as well as the design and alignment of business strategies, organizational designs, and human resource strategies. Case studies are employed to provide hands-on experience in analyzing and working with these concepts in actual situations.

ILRHR 4650 Globalization at Work

Spring. 4 credits. Prerequisite: undergraduate standing. R. Batt.

Examines how firms are responding to globalization and compares the strategies and outcomes of restructuring in manufacturing and service enterprises. While globalization has been a continuing phenomenon in manufacturing, recent changes in multilateral agreements, advances in information technology, and market deregulation have led to a process of globalization in service activities as well. Outcomes for firms, employees, consumers, and unions are examined.

ILRHR 4660 Entrepreneurship and Small Business

Fall. 4 credits. Prerequisite: undergraduate standing. D. Cohen.

Broadly addresses strategic issues in the startup phase and management of entrepreneurial firms and small businesses. Topics include opportunity recognition, satisfying real market needs, strategy, performance, financial planning, growth, and innovation. The course consists of a mix of lectures, case studies, guest speakers, and a final group project.

ILRHR 4662 Human Resource Analytics

Fall. 4 credits. J. Hausknecht.

Addresses the growing need for data-driven, analytical approaches to managing talent. Introduces students to the fundamental logic, metrics, analysis, and interpretation needed to link human resource practices to broader indicators of organizational performance. Students will be capable of gathering, integrating, analyzing, and interpreting relevant HR metrics to make better decisions about managing people in organizations.

ILRHR 4670 Leadership Development

Spring. 4 credits. Prerequisite: ILRHR 2600 or equivalent. L. Dragoni.

Focuses on leadership development at the organizational level. Specifically, it covers the structure, methods, and approaches that firms use to identify and develop high potential talent. Topics include: techniques for identifying development needs, on- and off-the-job approaches to development, and methods of program evaluation. The course combines traditional lectures and discussions with experiential learning techniques designed to provide practice with the concepts being learned.

ILRHR 4680 Human Resources Management Simulation

Fall, seven weeks. 2 credits. Limited to 30 students. Prerequisite: junior or senior standing; ILRHR 2600 or equivalent.

Regular attendance mandatory.

W. Wasmuth.

Uses a simulation model and an open-systems approach as means to enhance students' skills in strategic planning and managerial decision

making. Attention is given to the implications and efforts of strategic human resource managerial and supervisory decisions as measured by 10 organizational performance indicators, including quality of work life, employee productivity, customer satisfaction, employee retention, internal control, and the bottom line. Each student is assigned to a group (team) of five members and must be committed to the work of that group. An individual research paper is also required.

ILRHR 4950 Honors Program

Fall and spring (yearlong). 4 credits each semester.

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILRHR 4970-4980 Field Research, Internship

Fall and spring. 4 and 8 credits.

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILRHR 4990 Directed Studies

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILRHR 5600 Human Resource Management

Fall and spring. 3 credits. Prerequisite: graduate standing. Staff.

Survey course designed to provide an introduction to concepts and topics in human resource management. Consideration is given to theories and applications involved in effectively managing people in organizations. Topics include recruitment, staffing, training, performance management, retention, compensation, international human resource management, and the legal environment. Emphasis is placed on exploring these issues from both strategic and tactical levels to increase organizational effectiveness.

ILRHR 5640 Human Resources Management in Effective Organizations

Fall or spring. 4 credits. Offered only in New York City for M.P.S. program. Staff.

Offers students the opportunity to become better prepared to make effective decisions about human resources. Successful organizations depend on people, their human resources. The first module examines strategic human resource management and the effects of HR decisions on organization success and fair treatment of people. The second module focuses on alternative systems used to staff and develop people. The third module focuses on compensating and rewarding people. The final module includes employee relations and alternative work systems. Case and field studies are used throughout the course.

ILRHR 6590 HR Challenge: Balancing, Ethics, Economics, and Social Responsibility

Fall. 4 credits. Limited to 15 students. Prerequisite: ILRHR 2600/5600; M.I.L.R. graduates; seniors by permission of instructor. Letter grades only. P. Wright.

Examines the challenges of synthesizing personal/professional ethics with professional responsibilities and synthesizing organizational economic demands with social responsibility, particularly focusing on how these issues impact HR professionals. These concerns are examined from both ends of the political spectrum. The course is taught in a seminar format in which students are expected to participate in and lead class discussions.

ILRHR 6600 HR Leadership: Views from the Top

Fall. 4 credits. Limited to 30 students.

Prerequisites: ILRHR 2600/5600 or equivalent, senior or graduate standing, and permission of instructor. L. Dyer.

Hands-on course offering students a unique opportunity to learn about strategic business and human resource issues from the perspectives of senior HR executives. Five chief human resource officers (CHROs) from major corporations meet with the class for lively give-and-take sessions on subjects of strategic and topical interest to their organizations. Before their visits, teams prepare background papers on the speakers, their companies, and their topics. Students discuss these papers before the visits to assure readiness to address the issues at hand when the CHROs arrive. During the visits the teams host the CHROs and usually have an opportunity to interact informally with them. After the visits, the teams revise their background papers into white papers that reflect insights gleaned from their research and discussions. Subsequently, all five white papers are assembled in a book that is shared with the CHROs and others.

ILRHR 6601 Research on Education Reform and Human Resource Policy

Fall and spring. 4 credits. J. Bishop.

State and local efforts to improve K-12 education are employing a variety of (sometimes contradictory) reform strategies. This research seminar critically examines the case that is made for (and against) each of the major reform proposals and review studies that provide objective evidence on their effectiveness. The education reform strategies examined include vouchers, charter schools, small schools, career academies, extending the school day and year, better preparation and selection of new teachers, better professional development, ending tenure, merit pay, state standards and school accountability, ending social promotion, and externally set end-of-course examinations.

ILRHR 6602 Introduction to HR Information Systems

Fall, seven weeks. 1 credit. Prerequisite:

ILRHR 2660 or equivalent; use of Access or similar database package for at least data entry and report generation.

C. Homrighouse.

Focuses on understanding how and why human resource information systems are developed, maintained, and managed. A database is designed from the ground up, beginning with basic instruction on the need for and how to create a relational database. Once the initial design is in place, the data are manipulated to create reports, forms, and queries to assist in human resource decisions. The course examines ways to make databases efficient and consistent. Production database systems such as PeopleSoft also are reviewed and used. All instruction is hands-on and supplemented with assigned readings and guest lecturers.

ILRHR 6604 Global Field Study in Strategic Human Resources

Spring. 4 credits. Prerequisite: seniors by permission of instructor. Limited to 25 students. J. Haggerty.

This unique course provides students with in-depth information on strategic HRM in a selected region of the world. We will study the development of selected businesses, the

history, role and current efforts of government in the workplace, and local cultural nuances as they affect the world of work. Students will travel to the region studied and visit a variety of workplaces and institutions during spring break. Student presentations and a final paper will compare and contrast significant aspects of the dominant U.S. strategic HR model with strategic HR model(s) found in the studied region.

ILRHR 6605 Nonprofit Finance and Management

Spring. 4 credits. J. Grasso.

Provides students with a practitioner's focus on financial and managerial issues in the nonprofit sector, including universities, hospitals, government agencies, and foundations. The course will include an overview of nonprofit financial statements, debt issuance, endowment management, credit analysis, organizational governance issues, strategic planning, industry trends, executive compensation, and philanthropy. Students will gain a comprehensive overview of all critical aspects of nonprofit management. A research paper will allow students to focus on a particular nonprofit sector (e.g., environmental organizations, trade unions, private foundations) or to focus on a functional area (e.g., endowment management, philanthropy, organizational governance).

ILRHR 6606 Developing Leadership: Personally and in Organizations

Fall. 4 credits. Prerequisite: ILRHR 2600 or equivalent. L. Dragoni.

Focuses on two aspects of developing leadership. At the personal level, students' leadership skills are assessed and a plan for skill development is created. At the organizational level, students are exposed to the structure, methods, and approaches that organizations use to identify and develop high potential talent. In both aspects, the course combines traditional lectures and discussions with experiential learning techniques designed to provide practice with the concepts being learned.

ILRHR 6607 Executive Compensation

Fall. 4 credits. Prerequisite: ILRHR 5600 or equivalent. C. Tharp.

Provides students with an in-depth understanding of the structure and governance of executive compensation programs and practices. Course material draws upon theory and research in executive compensation and explores current legislative and shareholder reform initiatives affecting executive pay. The topic is approached from a multi-stakeholder perspective taking into account the interests of shareholders, institutional investors, advocacy groups, social activists, governmental regulators, employees, and executives. Also examined are the linkages between executive compensation and business strategy; issues surrounding compliance with securities laws, tax regulations, accounting standards, and principles of good corporate governance; various types of executive pay programs, including equity-based incentives, perquisites, and executive benefits; the roles of corporate compensation committees and independent compensation consultants; and current trends and best practices.

ILRHR 6608 Comparative Institutional Perspectives on Human Resource Management

Fall. 4 credits. R. Batt.

The globalization of product, labor, and capital markets has led to profound changes

in competitive environment in which firms operate. Yet these global economic forces are filtered through national institutions that offer unique sets of opportunities and constraints for multinational corporations doing business in different countries. Regional governance systems, such as the European Union, add another layer of complexity to the institutional environment in which firms operate; while governments at many levels are creating new regulatory rules in response to recent financial crises. Examines how corporations respond to these environmental complexities, why they adopt different approaches to business and HR management, and whether alternative strategies affect important outcomes for firms, employees, and other stakeholders.

ILRHR 6611 Seminar on Entrepreneurs and Entrepreneurial Organizations

Spring. 4 credits. D. Burton.

Entrepreneurs are modern-day heroes. We are increasingly captivated by the stories of people from humble origins who, with only a good idea and a bit of luck, build respected, high-profile organizations. In this seminar we will examine the myths and realities of entrepreneurship and the entrepreneurial process in the United States. Through case studies and readings, we will critically evaluate the received wisdom about building successful new ventures. Intended for students who are interested in learning more about entrepreneurship. It is not a "how to" course, but rather a conceptual overview of the field with particular emphasis on labor market and employment-related topics. Through readings and case studies, students will learn about topics such as opportunity assessment, organization growth and management, and entrepreneurial careers. We will examine different types of entrepreneurship including self-employment, franchising, small and family businesses, and externally financed new ventures. A seminar-style course where students will be expected to actively engage with the material. Requires coming to class having read the assigned material and being prepared to discuss and debate the ideas.

ILRHR 6620 Agility and Complexity in Organizations

Spring. 4 credits. Prerequisites: ILRHR 5600 or equivalent and permission of instructor. L. Dyer.

The need to compete in increasingly tumultuous environments is leading many companies to search for new ways of enhancing their adaptability, nimbleness, resilience, or agility. Most are focusing on flexing their basic bureaucracies and the first part of the course explores these efforts. A few, though, are tentatively exploring the desirability/feasibility of using basic tenets from complexity science to create new organizational forms that are capable of driving continuous innovation in the marketplace without having to go through internal change. The rest of the course focuses on these efforts and, at this point, the pedagogy shifts from traditional to experiential. Participants are provided opportunities to not only experiment with these new organizational forms, but also feel first-hand what life in them is like. The overall purpose of the course is to assist students in becoming knowledgeable forces for organizational transformation in the 21st century.

ILRHR 6640 HR Online Research and Reporting Methods for Executive Decision-Making

Spring. 4 credits. Limited to 18 students. Prerequisite: ILRHR 5600/2600 or equivalent. S. Basefsky.

Designed to develop key HR competencies and skills for researching and presenting information necessary for executive decision-making. Includes a comprehensive overview of primarily web-based resources available to HR executives. Emphasizes hands-on training in the best techniques and methods for extracting conceptual frameworks, checklists, best practices, competitive intelligence, legal information, statistical data, and academic research on topics of current interest to industry. Interviewing skills, report writing and presentation methods are imparted. Following five weeks of intense information instruction and hands-on experience, students act as consultants in a combined classroom and workplace setting as they work on special projects and topics posed by HR executives of primarily Fortune 500 companies. These team-based assignments give students exposure to different companies, their cultures, and executives while providing real work experience.

ILRHR 6650 Business Strategy and Human Resources

Fall. 4 credits. Limited enrollment. Prerequisite: ILRHR 2600/5600; three other courses in human resource studies; permission of instructor. D. Burton.

In this capstone course in HR studies, students integrate the theories and practices learned in other courses, to explore the linkages between business strategy and HRM. Extensive fieldwork is involved. The field projects are designed to make students explore and understand business strategy and draw upon and integrate their course work in HR staffing, training and development, compensation and rewards, and new work systems.

ILRHR 6660 Strategic HR Metrics

Spring. 4 credits. Prerequisites: ILRHR 2600/5600 or equivalent, one statistics course, one elective in HR studies. P. Wright.

The search for the ideal strategic HR metrics misses the larger issue of taking a more analytical approach toward HR decision making. Analytics requires understanding the process through which knowledge is gained, and then applying the tools and techniques to gather and analyze the right kind of data relevant to the question at hand. This course covers topics such as philosophy of science, theory development, research methodology, data analysis and interpretation as well as data and practices commonly used to assess the effectiveness of HR activities. Consequently, the class simultaneously addresses the types of information needed for HR decision making, as well as the processes and techniques necessary to gather, integrate, and analyze the data.

ILRHR 6680 Staffing Organizations

Spring. 4 credits. Prerequisites: ILRHR 2600/5600, one statistics course, or permission of instructor. C. Collins and J. Hausknecht.

Seminar providing an overview of the processes by which organizations staff positions with both internal and external applicants. Because staffing is one of the primary human resource activities, it is critical

for human resource professionals to understand how theory, research, and legal foundations can inform staffing decisions. Therefore, this course focuses on theories, research, policies, and practices concerning job recruitment and selection. Topics include staffing strategy and context, measurement of staffing effectiveness, job/competency analysis, human resource planning, recruitment and job choice, and internal and external selection practices.

ILRHR 6690 Managing Compensation

Spring. 4 credits. Limited to 30 students. Prerequisites: ILRHR 2600/5600 and statistics course. Staff.

Helps students gain an understanding of how to make decisions about compensation. The strong focus is on applications and includes some discussion of recent theory and research. By the end of the course, you should be able to design your own compensation system from scratch. Issues we consider include how compensation fits with an overall HR strategy, the internal focus on the firm (including alignment, job analysis, and job evaluation), making pay competitive with the outside market (including designing pay levels, types of pay and pay structures), considering individual contributions (by examining performance appraisals, pay-for-performance, and stock options), benefits (such as pensions, child care, and health care), management (including government regulation and managing budgets), and dealing with international issues in setting pay plans. A substantial section focuses on executive compensation and also examines how a consultant might estimate the damages to an employee in the case of wrongful termination.

ILRHR 6900 International Comparative Human Resource Management

Fall. 4 credits. Prerequisite: ILRHR 2600/5600 or permission of instructor. L. Nishii.

Provides students with an understanding of the complexities associated with international human resource management. The central theme of the course is to identify whether and in what ways HRM practices need to be adapted across cultures to be effective. Course material reflects a focus on comparing American HRM practices with those in East Asia and Western Europe. In addition, the major topic areas of concern to IHRM managers are covered, including the selection, training, compensation, and performance management of international managers (expatriates), coordination across subsidiaries of a company, the development and tracking of global leaders, and cross-cultural communication and negotiation.

ILRHR 6910 Finance for Human Resources

Fall. 4 credits. K. Hallock.

Helps students understand some basic ideas in finance from the perspective of human resource management. Broadly considers certain topics that include: overview of financial markets, how firms issue securities, history and pitfalls in investing, the time value of money, investment criteria such as net present value, risk versus return and the opportunity cost of capital, capital asset pricing, capital budgeting and risk, market efficiency and predictability, measuring firm financial performance and reading financial statements, event studies in finance and

economics, mergers, ESOPs and stock options, executive compensation, the relationship between job loss and firm outcomes, and other forms of organizational form such as nonprofits. Covers theoretical ideas and has many empirical, policy, and practitioner-relevant applications.

ILRHR 6930 Training and Development in Organizations

Spring, 4 credits. Prerequisite: ILRHR 5600 or permission of instructor. B. Bell. Acquaints students with aspects of learning in organizations. Begins by discussing organizational learning and then focuses more narrowly on specific ways in which learning is achieved through the training and development functions. Topics include how learning is linked to organizational strategy, how to determine that training is needed, issues regarding the design of training programs, current training techniques, evaluation strategies, and management development practices.

ILRHR 6940 Service Management in Global Perspective

Spring, 4 credits. Prerequisites: ILRHR 5600 or equivalent; permission of instructor. R. Batt.

This case-based course examines the fundamentals of service management in the context of globalization, with attention to the interaction among strategy, marketing, operations, and human resource management. Topics include: service process design, quality, and productivity improvement; customer relationship management; outsourcing and offshoring strategies, managing supplier and vendor relations; and implications for customers, employees, and firm competitiveness. Student projects focus on particular companies and industries and their international strategies.

ILRHR 6950 Education, Technology, and Productivity

Fall, 4 credits. J. Bishop. This seminar investigates the nexus between the education and training in schools and at the workplace and the technological progressiveness, productivity, and competitiveness of firms, individuals, and nations. Students investigate how technological progress is changing the nature of work and what this implies for reform of education and training; how education and training contribute to growth and competitiveness; why educational achievement has declined; and how the responsibility for education and training should be apportioned among individuals, firms, private nonprofit organizations, and government.

ILRHR 6970 Special Topics in Resource Studies

Fall or spring, 4 credits. Staff. Areas of study are determined each semester by the instructor offering the seminar.

ILRHR 6990 Advanced Desktop Applications

Spring, 1 credit. Prerequisite: ILRHR 2660 or significant experience (two to four years) using office applications. Letter grades only. C. Homrighouse. Explores advanced topics for common desktop applications including Windows, Word, Excel, Access, and PowerPoint. The course is designed based on student input and instructor recommendations, covering those subjects that students feel would be most useful and relevant in the job market.

Examples of areas include working with tables, columns, or sections in Word, pivot tables in Excel; taking a PowerPoint presentation "on the road"; and using join tables to create relationships in Access.

ILRHR 7560 Organizational Consulting
Fall, 3 credits. Prerequisite: ILRHR 5600. C. Collins.

Provides students with the insights and tools they need to work successfully as human resource management consultants, both as HR managers operating within the firm to improve organizational effectiveness and as external consultants providing project support to an internal HR organization. The consulting process is examined primarily from a systems perspective. This includes the knowledge and skills required to build trust and influence, to contract with clients, and to maintain good working relationships with clients. It also includes developing a clear comprehension of the consulting process from diagnosis, through action planning, to implementation and completion. While attention is given to theory and practice, the focus is on gaining hands-on experience dealing with real-world issues. As a final project, students will work in teams on a live case providing consulting services to an organization with an existing HR issue (i.e., implementing a new HR program, effectuating a new organizational culture, and enhancing project team operations).

ILRHR 7600 Seminar in Human Resource Studies

Fall or spring, 3 credits. Prerequisites: ILRHR 5600, ILRST 5110, and ILRHR 6690 and permission of instructor. Staff. "Floating" seminar designed to give faculty and students an opportunity to pursue specific topics in detail, with an emphasis on theory and research. Topics vary from semester to semester. Interested students should consult current course announcements for details.

ILRHR 7630 Interdisciplinary Perspectives on the Organization of Work

Fall or spring, 4 credits. R. Batt. Ph.D. seminar examining the theoretical and empirical literature on the organization of work. Topics include studies of group effectiveness, teams, social capital, and recent critical and international research. Draws on alternative perspectives from psychology, sociology, engineering, organization studies, economics, and industrial relations.

ILRHR 7640 Comparative International Perspectives on Work and Human Resource Systems

Fall or spring, 3 credits. R. Batt. Research seminar focusing on comparative international research on work and human resource systems. It draws on institutional theories and empirical research across several disciplines to examine the intersection between institutions and organizations. What is the relative importance of markets, technology, management strategies, and the institutional environment in shaping work and employment systems? It considers how and why firms adopt alternative approaches to work and how variation in these choices shapes outcomes of interest to firms, employees, and other key stakeholder groups. The seminar is designed to help students formulate theoretically driven research questions of critical importance to the field and to develop appropriate qualitative and quantitative research methodologies.

ILRHR 7900 ILR M.P.S. Program

Fall and spring, 1-9 credits. Supervised research only for those enrolled in the ILR M.P.S. program.

ILRHR 7980 Internship

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILRHR 7990 Directed Studies

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILRHR 9600 Workshop in Human Resource Studies

Fall and spring, 2 credits. Prerequisite: M.S. and Ph.D. candidates. S-U grades only. Staff.

Provides a forum for the presentation and critical discussion of current research being undertaken by graduate students, faculty members, and invited guests in the field of human resource studies. All M.S. and Ph.D. candidates in the Department of Human Resource Studies are urged to enroll; candidates in other departments are cordially invited. Each participant has an opportunity to benefit from the collective wisdom of the others in the formulation, design, and execution of his or her research, as well as to become current on the latest developments in the field.

ILRHR 9610 Doctoral Research Seminar in Human Resource Management (Micro)

Fall or spring, 3 credits. Prerequisite: Ph.D. candidates. Staff.

Aimed at reading, understanding, and conducting research in HRM. Students should obtain thorough understanding of the current research in traditional areas of HRM such as validation, job analysis, EEO, selection, performance appraisal, compensation, and training and should develop the skills necessary to evaluate, criticize, and contribute to the literature on HRM.

ILRHR 9620 Doctoral Research Seminar in Strategic Human Resource Management (Macro)

Fall or spring, 3 credits. Prerequisite: Ph.D. candidates. Staff.

Aimed at reading, understanding, and conducting research in SHRM. The course should enable students to obtain a thorough understanding of the current research in SHRM and to develop the skills necessary to evaluate, criticize, and contribute to the literature on SHRM.

ILRHR 9630 Research Methods in HRM/Strategic Human Resource Management

Fall and spring, 3 credits. Prerequisite: Ph.D. candidates. Staff.

Designed to build social science research skills, particularly in the area of human resource studies (HRS). Topics include measurement reliability, construct validity, design of studies, external validity, meta-analysis, critiquing/reviewing HRS research, publishing HRS research, and applications of statistical models of HRS issues.

ILRHR 9640 Doctoral Research Seminar: Special Topics

Fall, 3 credits. M.S. and Ph.D. candidates only. Staff.

Advanced doctoral seminar that covers selected topics in human resource management. Topics vary across semesters depending on student and faculty interests. The course is designed to allow students and

faculty to pursue scholarly topics that further the scientific study of human research management issues.

INTERNATIONAL AND COMPARATIVE LABOR

M. Cook, chair (336 Ives East, 255-1349); R. Batt, J. Bishop, G. Boyer, A. Colvin, L. Compa, I. DeVault, G. Fields, R. Givan, J. Gross, S. Kuruvilla, L. Nishii, and L. Turner.

ILRIC 2301 Migrants and Migration

Fall. 3 credits. Sophomore writing course. M. Cook.

Focuses on the international migration experience through the perspective of migrants themselves, drawing upon first-person accounts, letters and interviews, fiction, and nonfiction. Looks at global and regional migration processes and at national policies that shape migration.

ILRIC 2350 Work, Labor, and Capital in the Global Economy

Fall and spring. 3 credits. Open to ILR freshmen and sophomores; juniors and seniors must obtain prior permission from instructors, R. Applegate, R. Batt, M. Cook, K. Griffith, and S. Kuruvilla. Guest lecturers via videoconferencing.

Provides an introduction to how globalization is changing the nature of work, labor, and capital. It examines both contemporary and historical debates about globalization, but also covers a number of interrelated issues, including the regulation of labor standards, the mobility of capital, the rise of global production systems, and international labor migration. Lectures and discussion for the topics mentioned above will be grounded in the experiences of different countries, firms, workplaces, industrial sectors, and individuals.

ILRIC 2360 Revitalizing the Labor Movement: A Comparative Perspective

Spring. 3 credits. Sophomore writing course. L. Turner.

Writing seminar that examines contemporary efforts in the United States and Europe to revitalize unions in broad political, social, economic and workplace contexts.

ILRIC 3340 Perspectives on Work and Welfare

Spring. 4 credits. R. Givan.

Examines the relationship between work and welfare from a variety of perspectives. Examples will be drawn from advanced industrial countries, and international comparisons will be emphasized. Key topics will include: welfare state foundation and development; social citizenship, constructions of the deserving and undeserving poor; welfare reform; the relationship between low wage work and welfare; competing notions of entitlement and universality; the male breadwinner model; firms and welfare.

[ILRIC 3390 The Political Economy of Mexico

Spring. 4 credits. Next offered 2010–2011. M. Cook.]

ILRIC 4330 Politics of the Global North (also GOVT 3303)

Fall and spring. 4 credits. L. Turner. With an emphasis on current events and world affairs, this course examines global governance and economic policy debates. We

consider conflicts around markets, democracy, and global justice, including efforts aimed at economic recovery and the reform of national and global economic policy and institutions. We also look at distinctive types of political and economic organization, especially in Europe and the United States, and the capacities of these societies to meet current economic, political, and social challenges, both domestic and international.

ILRIC 4990 Directed Studies

For description, see “Collective Bargaining, Labor Law, and Labor History.”

ILRIC 6010 Crossing Borders: Migrations in Comparative Perspective

Spring. 4 credits. M. Cook.

Provides an introduction to the challenges posed by the movement of people across borders. Examines the links between globalization and migration, and explores the implications of contemporary migrations for national immigration and integration policies, labor markets, human rights, asylum, security, and politics. Regional and national cases will be drawn from Europe, North America, and Australia, among others.

ILRIC 6011 Comparative Education and Development

Spring, seven-week course. 2 credits. J. Bishop.

Comparative study of educational institutions in Western Europe, North America, Latin America, and Asia (with special emphasis on math and science education) and of the effects of these institutions on economic development, growth, and equality of opportunity. The institutions studied include primary and secondary education, apprenticeship, and higher education. Data on the consequences of policies are presented and an effort made to understand how human resource policies and educational institutions have contributed to rapid growth in both poor and rich countries. Another focus is understanding the causes of the differences in achievement levels across nations.

ILRIC 6012 Comparative Labor and Employment Law

Spring. 4 credits. A. Colvin.

Examines the laws governing employment and labor relations in comparative perspective. It covers examples of employment and labor law systems of countries from a number of different regions of the world including Europe, the Americas, Africa, Asia, and Australia. It also examines insights from comparative perspectives on major contemporary employment and labor law issues. The course assumes some existing knowledge of American employment and labor law, but will also consider American employment and labor law in comparative perspective.

ILRIC 6020 Corporate Social Responsibility: Human Rights, Labor, and the Environment

Spring. 4 credits. L. Compa.

Covers recent and current developments in the field of corporate social responsibility (CSR) and socially responsible investment (SRI) in a context of economic globalization. First classes set a foundation on the role of the multinational company in the global economy and international standards on human rights, labor rights, and the environment. Classes then move to topical studies of CSR/SRI initiatives and controversies. A consistent underlying theme

of the course is the tension (and how to resolve it) between voluntary corporate self-regulation and mandatory government and intergovernmental regulation of corporate activity.

ILRIC 6310 Comparative Labor Movements in Latin America

Fall. 4 credits. M. Cook.

Examines the historical development of labor movements in Latin America, their role in national political and economic development, and the impact of economic liberalization, authoritarianism, and redemocratization on contemporary labor organizations in the region. Countries examined include, but are not limited to, Mexico, Brazil, Argentina, Chile, Peru, and Guatemala.

ILRIC 6330 Global Debates and Comparative Political Economy

Fall and spring. 4 credits. Prerequisite: graduate standing. L. Turner.

For description, see ILRIC 4330. The subject matter is similar (and students are encouraged to attend the lectures for 4330), but this course is pitched at graduate students, in a seminar format emphasizing particular weekly themes and active student participation.

ILRIC 6331 Special Topics

Fall. 4 credits.

Devoted to new topics in the field. The specific content and emphasis vary depending upon the interests of the faculty member teaching the course.

ILRIC 6340 International Labor Law

Fall or spring. 4 credits. Prerequisites: undergraduates, ILRCB 2010; graduate students, ILRCB 5010. L. Compa.

Examines labor rights and labor standards in a world economy regulated by bilateral and multilateral trade agreements, in a context of sharp competition among countries and firms. Readings and discussions focus on the intersections of labor, human rights, and international trade law and policy in this new global economic context. A prior course in a related topic may be helpful but is not required—the first classes are meant to establish a foundation in each area. While labor law is a unifying theme, the course is more policy-oriented than legalistic. After the introductory classes on labor rights, human rights, and trade, the focus turns to a series of topics that reflect the links between labor rights and trade.

[ILRIC 6350 Labor Markets, Income Distribution, and Globalization: Perspectives on the Developing World

Spring. 4 credits. Prerequisite: ILRLE 2400 or ILRLE 5400 or ECON 3130. Next offered 2010–2011. G. Fields.

The first half of the course is on distribution and development: theory and evidence. The second half is on labor markets in a globalized world.]

ILRIC 6360 Comparative History of Women and Work (also FGSS 6360)

Spring. 4 credits. Prerequisite: permission of instructor. I. DeVault.

Explores the similarities and differences between different cultures' assumptions about the work of women as well as women's experiences in varying work circumstances throughout history. Beginning with theoretical pieces and overviews of the history of women and work, most of the course consists of in-depth examinations of specific work

situations or occupations across time and geography. Comparative examples are taken from the United States, Europe, and the Third World.

ILRIC 6370 Labor Relations in Asia

Fall. 4 credits. Limited enrollment; open to graduate students, seniors, and juniors. S. Kuruvilla.

Serves as an introduction to industrial relations in Asia. The emphasis is on highlighting the variation in industrial relations systems in Asia and will focus more on the systems of Japan, China, India, South Korea, and Singapore.

[ILRIC 7300 Research Seminar on Labor Markets in Comparative Perspective]

Fall and spring. 3 credits. Prerequisite: M.S. and Ph.D. students. Next offered 2010–2011. G. Fields.

For students writing theses or dissertations on economic aspects of labor markets in comparative perspective. Presentations and written papers required.]

[ILRIC 7310 Industrial Relations in Latin America]

Fall. 4 credits. Next offered 2010–2011. M. Cook.

Examines and compares changes in contemporary industrial relations throughout Latin America, with some comparative references to other regions of the Global South. The aim is to introduce students to the main issues in industrial relations of key Latin American countries, and through individual research papers, to enable students to become familiar with a specific country or sector/ theme in two or more countries of the region.]

ILRIC 7360 Labor and Global Cities (also GOVT 7060)

Fall. 4 credits. L. Turner.

Examines social coalition building and innovative union strategies aimed at organizing, bargaining, economic development, and political influence in the United States and Europe. Student projects may focus on major cities anywhere in the world.

ILRIR 7900 ILR M.P.S. Program

Fall and spring. 1–9 credits.

Supervised research only for those enrolled in the ILR M.P.S. program.

ILRIR 7990 Directed Studies

For description, see “Collective Bargaining, Labor Law, and Labor History.”

Other courses approved to fulfill the ILRIC distribution requirement

ILRCB 3830 Workers' Rights as Human Rights

Fall. J. Gross.

For description, see “Collective Bargaining, Labor Law, and Labor History.”

ILRHR 4600 International Human Resource Management

Spring. L. Nishii.

For description, see “Human Resource Studies.”

ILRHR 4610 Working in the New Economy: The Sociology of Work

Spring. R. Batt.

For description, see “Human Resource Studies.”

ILRHR 4650 The Globalization at Work

Spring. R. Batt.

For description, see “Human Resource Studies.”

ILRHR 6900 Comparative Human Resource Management

Fall. L. Nishii.

For description, see “Human Resource Studies.”

ILRHR 6980 International Human Resource Policies and Institutions

Spring. J. Bishop.

For description, see “Human Resource Studies.”

ILRLE 4440 The Evolution of Social Policy in Britain and America (also ECON 4440)

Fall, spring. G. Boyer.

For description, see “Labor Economics.”

ILRLE 4480 Topics in 20th-Century Economic History: The Economics of Depression and the Rise of the Managed Economy (also ECON 4580)

Fall. G. Boyer.

For description, see “Labor Economics.”

ILRLE 6420 Economic Analysis of the Welfare State (also ECON 4600)

Fall. 4 credits. R. Hutchens.

For description, see “Labor Economics.”

INTERDEPARTMENTAL COURSES

ILRID 1500 Freshman Colloquium

Fall. 1 credit. Prerequisite: ILR freshmen. S–U grades only. Staff.

Acquaints first-year students with issues and disciplines in the field of industrial and labor relations and to establish acquaintanceship among members of the ILR faculty and small, randomly assigned groups of students. Includes a plant visit and several meetings early in the semester designed to introduce issues encountered in studying the employment relationship.

ILRID 5660 Public Policy

Spring. 4 credits. Offered only in New York City for M.P.S. program. Staff.

The government's influence on the workplace and the role of public policy in the use and preparation of the nation's human resources for employment is assessed. Areas of study include the government's historical role in the labor market and the effect of efficiency, price stability and economic growth, equity, and immigration policy and its market implications.

ILRID 5990 Cross-Cultural Work Experience

Fall. 1 credit. S–U grades only.

W. Sonnestuhl.

Open to MILR students who will be working in the summer of 2008 in a country other than that of their citizenship or past work experience. This option is only available for students who have been enrolled for one academic year by the time the Internship begins. Enrollment occurs in regular pre-enrollment period, with a grade posted in the fall after the requirements are satisfied. Prior to registering for the course, students must obtain a summer internship offer and international students MUST report to the ISSO (B50 Caldwell Hall) for their work authorization forms.

ILRID 7900 ILR M.P.S. Program

Fall and spring. 1–9 credits.

Supervised research only for those enrolled in the ILR M.P.S. program.

LABOR ECONOMICS

G. Boyer, chair (364 Ives Hall, 255-2752); J. Abowd, F. Blau, R. Ehrenberg, G. Fields, M. Freedman, K. Hallock, R. Hutchens, K. Jackson, G. Jakobson, L. Kahn, and R. Smith

ILRLE 2400 Economics of Wages and Employment

Fall and spring. 3 credits. Prerequisites: ECON 1110–1120 or permission of instructor; ILR students may substitute ILRLE 4400 if they have calculus.

Applies the theory and elementary tools of economics to the characteristics and problems of the labor market. Considers both the demand (employer) and supply (employee) sides of the market to gain a deeper understanding of the effects of various government programs and private decisions targeted at the labor market. Topics include employment demand, basic compensation determination, education and training, benefits and the structure of compensation, labor-force participation and its relation to household production, occupational choice, migration, labor-market discrimination, and the effects of unions.

ILRLE 3440 Development of Economic Thought and Institutions (also ECON 3440)

Fall. 4 credits. Prerequisite: ECON 1110–1120 or equivalent. G. Boyer.

Examines the historical roots of the economic institutions currently dominant in Western Europe and the United States, and the evolution of economics as a discipline, from pre-industrial mercantilist thought through the economics of John Maynard Keynes. Readings focus on the relationship between economic development and the evolution of economic thought, and in particular on policies relating to labor and the relief of poverty.

ILRLE 4400 Labor Market Analysis (also ECON 3410)

Spring. 4 credits. Prerequisites: ECON 3130 and calculus; ILR students who have taken ILRLE 2400 cannot receive credit for this course.

For description, see ILRLE 2400. Designed for ECON majors with calculus.

ILRLE 4410 Income Distribution (also ECON 4550)

Spring. 4 credits. Prerequisite: ILRLE 2400 or ECON 3410. Students who have taken PAM 370 may not receive credit for 441. R. Hutchens.

Explores income distribution in the United States and the world. Topics include functional and size distributions of income, wage structure, income-generating functions and theories, discrimination, poverty, public policy and income distribution, and changing income distribution and growth.

ILRLE 4420 The Economics of Employee Benefits (also ECON 4560)

Fall. 4 credits. Prerequisite: ILR 2400 or equivalent. Staff.

In-depth treatment of the economics and financial management and administration of all employee benefits: health care, insurance,

retirement income, family-care benefits, executive incentive plans, and other compensation provided as a service or contingent financial package to employees. Includes detailed international comparisons of health care and retirement systems are included.

ILRLE 4430 Compensation, Incentives, and Productivity (also ECON 4430)

Fall. 4 credits. Prerequisite: ILRLE 2400 or equivalent. Staff.

Examines topics in labor economics of particular relevance to individual managers and firms. Representative topics include recruitment, screening, and hiring strategies; compensation (including retirement pensions and other benefits); training, turnover, and the theory of human capital; incentive schemes and promotions; layoffs, downsizing, and buyouts; teamwork; and internal labor markets. Focuses on labor-related business problems using the analytic tools of economic theory and should appeal to students with strong quantitative skills who are contemplating careers in general business, consulting, and human resource management as well as in economics.

ILRLE 4440 The Evolution of Social Policy in Britain and America (also ECON 4440)

Fall or spring. 4 credits. Prerequisite: ILRLE 2400 or equivalent. G. Boyer.

Surveys the history of social policy in Great Britain and the United States from 1800 to the adoption of the British welfare state after World War II. Topics include the role of poor relief in the early 19th century; the changing relationship between public relief and private charity; the adoption of social insurance programs and protective labor legislation for children and women; government intervention in the Great Depression; and the beginnings of the welfare state.

ILRLE 4450 Women in the Economy (also ECON 4570, FGSS 4460)

Fall. 4 credits. Prerequisite: ILRLE 2400 or equivalent. Staff.

Examines the changing economic roles of women and men in the labor market and in the family. Topics include a historical overview of changing gender roles; the determinants of the gender division of labor in the family; trends in female and male labor force participation; gender differences in occupations and earnings; the consequences of women's employment for the family; and a consideration of women's status in other countries.

ILRLE 4470 Social and Economic Data (also ILRLE 7400, INFO 4470)

Spring. 4 credits. Prerequisites: one semester of calculus, IS statistics requirement, at least one upper-level social science course, or permission of instructor. J. Abowd.

For description, see INFO 4470.

ILRLE 4480 Topics in 20th-Century Economic History: The Economics of Depression and the Rise of the Managed Economy (also ECON 4580)

Spring. 4 credits. Prerequisite: ILRLE 2400 or ECON 3140. G. Boyer.

Examines the anatomy of the Great Depression through the experiences of the two most important economies of the time: the United States and Great Britain. Also examines the development of macroeconomic

policy in the United States and Britain in the 1920s and 1930s and its evolution in the postwar world, culminating with the decline of Keynesian-style demand management policy under Reagan and Thatcher.

ILRLE 4950 Honors Program

Fall and spring (yearlong). 4 credits each semester.

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILRLE 4970-4980 Field Research, Internship

Fall and spring. 4 and 8 credits.

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILRLE 4990 Directed Studies

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILRLE 5400 Labor Economics

Fall. 3 credits. Requirement for M.I.L.R. candidates. Prerequisites: ECON 1110-1120 or equivalent. Not open to students who have taken NBA 5440. G. Fields.

A course in labor market economics for prospective managers in the corporate, union, and governmental sectors. It begins with demand and supply in labor markets, presenting market-level analysis and the decision tools for workers and firms. It then goes on to consider various topics for managers including: education and training investments; the interdependence of capital market and labor market decisions; pay and productivity; attracting and retaining talent; workplace metrics; and pensions and retirement. The final section of the course covers public policy issues including policy evaluation methods, unemployment, poverty and inequality, and discrimination.

ILRLE 5440 Labor Market and Personnel Economics

4 credits. Offered only in New York City for M.P.S. program. Staff.

Four-module course in which the first module covers the basic elements of supply and demand in the labor market, the second and third modules cover the "new personnel economics" (emphasizing economic issues in a firm that relate to selecting, training, assigning, motivating, and compensating workers), and the final module covers key institutions and economic security issues (including unemployment, pensions, disability, discrimination, and unions). The goals of this course are for students to learn to analyze both business and public policy problems, taking into account both basic principles of economic theory and the relevant institutional environments.

ILRLE 6420 Economic Analysis of the Welfare State (also ECON 4600)

Fall. 4 credits. R. Hutchens.

Uses the tools of public economics to analyze modern welfare states. Although examples are drawn from several countries, the course focuses on the United States, Canada, and Sweden. What are the rationales for the level of government intervention in these states, and how do these rationales square with notions of market failure? What are the economic costs and benefits of taxes, transfers, and regulations in these states? Can voting models explain the growth and operation of welfare states? The possible answers to these questions are discussed.

ILRLE 6470 Economics of Education (also ECON 3470)

Spring. 4 credits. Prerequisite: ILRLE 2400 or intermediate microeconomics and statistics through multivariate linear models. R. Ehrenberg.

A survey of the econometric literature on a wide variety of educational issues, dealing with elementary, secondary, and higher education. The course begins with an introduction to experimental and quasi-experimental design and the implementation of these designs in multivariate regression models. Much of the course involves reading and discussing recent research, and students conduct their own empirical research projects.

ILRLE 6480 Economic Analysis of the University (also ECON 3420)

Fall. 4 credits. Staff.

Seeks to illustrate the complexity of decision making in a nonprofit organization and to show how microeconomic analysis in general, and labor market analysis in particular, can usefully be applied to analyze resource allocation decisions at universities. Topics include financial aid, tuition, admissions policies, endowment policies, faculty salary determination, the tenure system, mandatory retirement policies, merit pay, affirmative action, comparable worth, collective bargaining, resource allocation across and within departments, undergraduate versus graduate education, research costs, libraries, athletics, and "socially responsible" policies. Lectures and discussions of the extensive readings are supplemented by presentations by Cornell administrators and outside speakers who have been engaged in university resource allocation decisions or have done research on the subject.

ILRLE 7400 Social and Economic Data (GR RDC) (also INFO 7470, ECON 7400)

Spring. 4 credits. J. Abowd.

Teaches the basics required to acquire and transform raw information into social and economic data. Graduate materials emphasize methods for creating and certifying laboratories in which data privacy and confidentiality concerns can be controlled and audited. Legal, statistical, computing, and social science aspects of the data "manufacturing" process are treated. The formal U.S., Eurostat, OECD, and UN statistical infrastructure are covered as are major private data sources. Topics include basic statistical principles of populations and sampling frames; acquiring data via samples, censuses, administrative records, and transaction logging; the law, economics, and statistics of data privacy and confidentiality protection; data linking and integration techniques (probabilistic record linking; multivariate statistical matching); analytic methods in the social sciences. Graduate students are assumed to be interested in applying these techniques to original research in an area of specialization, and are required to do individual projects. This class may be taught to students at Cornell and other universities whose emphasis is placed on U.S. Census Bureau procedures.

ILRLE 7410 Applied Econometrics I (also ECON 7480)

Fall. 4 credits. Prerequisite: graduate Ph.D.-level sequence in econometrics or permission of instructor. S-U or letter grades. G. Jakubson.

Considers methods for the analysis of longitudinal data, that is, data in which a set of individual units are followed over time. Focuses on both estimation and specification testing of these models. Students consider how these statistical models are linked to underlying theories in the social sciences. Course coverage includes panel data methods (e.g., fixed, random, mixed effects models) factor analysis, measurement error models, and general moment structure methods.

ILRLE 7420 Applied Econometrics II (also ECON 7492)

Spring. 4 credits. Prerequisite: ILRLE 7410 or permission of instructor. Letter or S-U grades. G. Jakubson.

Continues from ILRLE 7410 and covers statistical methods for models in which the dependent variable is not continuous. Covers models for dichotomous response (including probit and logit); polychotomous response (including ordered response and multinomial logit); various types of censoring and truncation (e.g., the response variable is only observed when it is greater than a threshold); and sample selection issues. Includes an introduction to duration analysis. Covers not only the statistical issues but also the links between behavioral theories in the social sciences and the specification of the statistical model.

ILRLE 7430 Applied Econometrics III

Spring. 4 credits. Prerequisites: ILRLE 7410-7420 or permission of instructor. ILRLE 7410, 7420, and 7430 constitute Ph.D.-level sequence in applied microeconomics. Letter grades only. G. Jakubson.

Covers topics not covered in ILRLE 7410-7420, including further development of duration analysis, panel data methods for nonlinear models, quantile regression and related techniques, and an introduction to nonparametric and semiparametric methods. Additional topics as suggested by their use in applied areas of social science. Covers not only the statistical issues but also the links between behavioral theories in the social sciences and the specification of the statistical model. Also develops a general framework for the techniques covered in the ILRLE 7410-7420-7430 sequence.

ILRLE 7450 Seminar in Labor Economics I (also ECON 7420)

Fall. 4 credits. Note: ILRLE 7450 and 7460 constitute Ph.D.-level sequence in labor economics.

Includes reading and discussion of selected topics in labor economics. Stresses applications of economic theory and econometrics to the labor market and human resource areas.

ILRLE 7460 Seminar in Labor Economics II (also ECON 7430)

Spring. 4 credits. Note: ILRLE 7450 and 7460 constitute Ph.D.-level sequence in labor economics.

Includes reading and discussion of selected topics in labor economics. Stresses applications of economic theory and econometrics to the labor market and human resource areas.

ILRLE 7470 Economics of Education I (also ECON 7470)

Spring. 4 credits. Limited to economics and labor economics Ph.D. students or by permission of instructor. R. Ehrenberg.

Survey of the econometric research on a wide variety of higher education issues. Topics include public and private funding, financial aid and tuition policies, faculty labor markets, and Ph.D. production.

ILRLE 7471 Economics of Education II

Fall. 4 credits. K. Jackson.

Survey of the econometric research and theory on a wide variety of education issues at the elementary and secondary level. Topics include school finance policies, peer effects, accountability, incentives, class size debate, and teacher labor markets. The two-semester sequence in the Economics of Education can be taken in any order.

ILRLE 7490 Economics of Development (also ECON 7720)

Fall. 4 credits. Prerequisites: first-year graduate economic theory and econometrics. G. Fields.

Takes analytical approaches to the economic problems of developing nations. Topics include old and new directions in development economics thinking; the welfare economics of poverty and inequality; empirical evidence on who benefits from economic development; labor market models; project analysis with application to the economics of education; and development policy.

ILRLE 7900 ILR M.P.S. Program

Fall and spring. 1-9 credits.

Supervised research only for those enrolled in the ILR M.P.S. program.

ILRLE 7980 Internship

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILRLE 7990 Directed Studies

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILRLE 9400 Workshop in Labor Economics

Fall and spring. 3 credits. Intended for Ph.D. students who have started to write their dissertations.

Presentations of completed papers and work in progress by faculty members, advanced graduate students, and speakers from other universities. Focuses on the formulation, design, and execution of dissertations.

ORGANIZATIONAL BEHAVIOR

P. Tolbert, chair (146 East Ives Hall, 255-9527); S. Bacharach, M. Besharov, J. Goncalo, T. Hammer, E. Lawler, B. Rubineau, M. Williams, W. Sonnenstuhl

ILROB 1220 Introduction to Organizational Behavior

Fall and spring. 3 credits. Staff.

Introductory survey course of theory and research on individual and group processes (including personality, motivation, communication, leadership), as well as structural and economic forces (including organizational design, power relations, inter-organizational ties, social norms and laws) that shape the contemporary workplace.

ILROB 1750 Behavior, Values, and Performance

Fall and spring. 3 credits. Not open to ILR students. Staff.

Examines the modern technology-based organization as a workplace. With global competitive dynamics as a backdrop, the course explores how organizational structures, processes, and practices have evolved to meet environmental challenges and will define the behavioral implications of those changes for practicing engineers and designers and managers who work with them. Interpreting such changes and building a capacity for professional effectiveness in this environment requires students to develop a working familiarity with an array of social and behavioral science literature, dealing with such matters as personal identity, motivation, and job design; creativity and the organizational enablers to innovation; group dynamics and project effectiveness; perception, communication, and cross-cultural understanding; and ethical decision making in a high-stress environment. The teaching cases/situations used reflect the orientation of the course toward technology-based organizations.

ILROB 2220 Controversies about Inequality (also SOC/PAM/DSOC/GOVT 2220, PHIL 1950)

Spring. 4 credits. S. Morgan.

For description, see SOC 2200.

ILROB 2225 Commitments to Groups and Organizations

Fall. 3 credits. Sophomore writing course. E. Lawler.

Deals with how and when people become committed to groups and organizations. Such commitments are an important source of social order, solidarity, altruism, and citizenship behavior in small groups and large organizations. Emphasizes sociological and social psychological theories of commitment, solidarity, and order, including in particular those dealing with the role of power, legitimacy, trust, affect, and social identity. Taught in a seminar format and involves frequent writing assignments and a major paper.

ILROB 3200 The Psychology of Industrial Engineering

Fall. 4 credits. T. Hammer.

Study of the human factors in the industrial engineering of work, workplaces, tools, and machinery. Examines the aspects of individual and social psychology that operate in the work setting and that should be taken into account in the design of jobs. These include limitations of the human sensory system; individual difference in skills, abilities, motives, and needs; group dynamics; intrinsic motivation; job satisfaction; and conflict.

ILROB 3201 Organizational Change: Theory and Practice

Fall. 3 credits. Prerequisite: ILROB 1220. M. Besharov.

Examines problems of change in organizations from both a theoretical and practical perspective. We consider questions such as: How does change occur in organizations? What is the role of leaders in creating and sustaining change in organizations? What is organizational culture and how does it affect change? The course draws on theory and research from sociology and related disciplines. Course material also includes case studies and interactive exercises.

ILROB 3210 Group Solidarity (also SOC 3110)

Fall. 4 credits. M. Macy.

For description, see SOC 3110.

ILROB 3290 Organizational Cultures

Fall or spring. 4 credits. Prerequisite: one or more courses in OB and/or sociology. W. Sonnenstuhl.

Reviews the concept of culture as it has evolved in sociology and anthropology, applying it to formal organizations in workplaces such as corporations and unions. The course first examines the nature of ideologies as sense-making definitions of behavior, concentrating on the cultural forms that carry these cultural messages, rituals, symbols, myths, sagas, legends, and organizational stories. Considerable attention is given to rites and ceremonials as a cultural form in organizational life that consolidates many of these expressive forms into one. The course examines types of ceremonial behavior such as rites of passage, rites of enhancement, and rites of degradation, including the role of language gestures, physical settings, and artifacts in ceremonial behavior. The presence of subcultures and countercultures in organizational behavior also receive attention, especially the part played by occupational subcultures in formal organizations.

ILROB 3700 The Study of Work Motivation

Fall. 4 credits. Prerequisite: junior or senior standing. T. Hammer.

Designed to acquaint students with the basic concepts and theories of human motivation with implications for job design and organizational effectiveness. Focuses on theories of worker motivation and on research approaches and results as they apply to the performance of individuals and groups in formal organizations. Readings are predominantly from the field of organizational psychology, supplemented by relevant contributions from experimental and social psychology. Each student designs, executes, and analyzes a research study of his or her own.

ILROB 4220 Organizations and Deviance

Fall or spring. 4 credits. Limited to 60 students. W. Sonnenstuhl.

Focuses on the deviant actions of organizations, including such behaviors as price fixing, environmental pollution, illegal campaign contributions, and discrimination in hiring and promotion. Examines the origins of such behaviors in organizations, the processes by which they became institutionalized, and the processes by which they become defined as deviant organizational actions. Within this context, the course examines such contemporary cases as Exxon's Valdez oil spill, Iran-Contra, drug testing, and the federal savings and loan scandal. These events raise troubling questions about what it means to live and work in an organizational society, and they cannot be dismissed as instances of a few individuals gone bad.

ILROB 4230 Leadership in Organizations

Fall or spring. 4 credits. T. Hammer.

Covers basic leadership theories with an emphasis on how they are used, analyzes leadership cases, and examines current leadership surveys and training materials. We also study leadership philosophies and management practices in countries outside of the United States. In addition, you learn to evaluate and use leadership "best-sellers," that is, the kind of books that sell in airports.

ILROB 4240 Social Influence and Persuasion

Fall. 4 credits. Prerequisites: junior or senior standing. J. Goncalo.

Many of the most admired organizations are adept at using social influence to achieve their strategic objectives. This course reviews basic theories of social influence such as conformity, group polarization, and social facilitation to understand how social influence tactics can be used to make organizations more efficient and productive. The course also considers how these tactics can backfire when excessive agreement gives rise to groupthink and poor decisions. We conclude by exploring strategies for managing social influence processes to encourage creativity and innovation in organizations.

ILROB 4250 Seminar in Organizational Culture

Spring. 4 credits. Limited to 20 students. Prerequisite: ILROB 3290 and permission of instructor. W. Sonnenstuhl.

Expands on the theoretical ideas developed in the earlier course through more focused reading, intensive fieldwork, and paper writing. Students are accepted into the seminar based on their research projects for ILROB 3290 and work with the professor to develop a more detailed reading list and more focused data collection strategy for expanding upon their earlier projects. The seminar also is taught as an intensive writing experience.

ILROB 4260 Managing Creativity

Fall. 4 credits. J. Goncalo.

Although most people can agree that creativity is an important concept, there is often very little agreement about what creativity is and how we can achieve it. This course surveys basic theories of creativity with the goal of applying this knowledge to the management of creativity in organizations. It focuses primarily on (1) cognitive theories about creative thought, (2) personality theories about exceptionally creative individuals (3) social-psychological theories about creative groups, and (4) the points at which these approaches interact. The course concludes by questioning whether, given the costs involved, anyone would willingly follow the path of a creative individual or implement the practices of the most innovative firms.

ILROB 4270 The Professions: Organization and Control

Fall. 4 credits. Prerequisite: permission of instructor. P. Tolbert.

Focuses on the sources of power and control exercised by professional groups in contemporary society. A number of issues are examined in this context, including the role of professions in society, processes through which an occupational group becomes defined as a profession, sources of control that professional associations have over their members, relations between professionals and nonprofessionals in organizations, and the relationship between unionization and professionalization of occupations.

ILROB 4280 Blue-Collar Work in America

Spring. 4 credits. Prerequisites: ILROB 1220. S. Bacharach and W. Sonnenstuhl.

Although America is often described as a post-industrial society in which service jobs predominate, the term "blue collar" remains relevant for understanding workplace relationship and their consequences. This course examines the nature of blue-collar work in the 21st century. It takes an in-depth

look at a number of blue-collar occupations to understand workers' experiences. Special attention is paid to the manner in which management exercises control over blue-collar workers, the strategies workers use to gain greater discretion over their work, and the social and psychological consequences that follow from this struggle. This course uses lectures, readings, and interviews/discussions with blue-collar workers to illuminate workers' experiences. It uses long-distance learning technology to bring New York city-based blue-collar workers into the Ithaca classroom.

ILROB 4290 Organizational Politics and Institutional Change

Spring, seven weeks. 2 credits. Prerequisite: junior or senior standing; permission of instructor. Students should see instructor before first class. S. Bacharach.

Examines the market, cultural, political, and structural forces that change the organizational "rules of the game," how those changes affect individuals and organizations, and the distortions that occur as individuals and organizations attempt to adjust to a new unstable order. Issues examined include power, corruption, deal-making, rationality, uncertainty, and competition. Course requirements include completing a major research paper and leading a class discussion.

ILROB 4700 Group Processes

Fall. 4 credits. Prerequisites: ILROB 1220 or equivalent; junior or senior standing. E. Lawler.

A review of theoretical approaches and selected research on group phenomena, including the formation of groups, the structure of group relations, and group performance. Specific topics include conformity and obedience, status and power relations, social identity, emotions and emotion management, group solidarity and commitment, and groups within larger organizations.

ILROB 4710 Organizations and Negotiation

Spring. 4 credits. *If you have completed ILROB 6011 you are NOT eligible to take this course.* Course fee: \$31, which includes cases for in-class negotiation simulations, online Negotiation Style Survey, and individualized assessment report. M. Williams.

This introductory course provides understanding of the theory and the processes of negotiations as practiced in a variety of organizational settings. It is designed for relevance to the broad spectrum of bargaining problems faced by team members, managers, and professionals. It allows students the opportunity to develop negotiation skills experientially and to understand negotiation by using analytical frameworks. General topics include: distributive bargaining, integrative negotiations, psychological biases, and multiparty negotiations. Advanced topics include: sources of power, dispute resolution, emotionally intelligent negotiations, team on team negotiations (e.g., union management). Simulations, exercises, role-playing, and cases are emphasized.

ILROB 4720 Applied Organizational Behavior

Fall. 4 credits. Prerequisite: ILROB 1220. S. Bacharach.

Introduces students to intermediate theory of organizational behavior. Concentrates specifically on teaching students to use

organizational theories for analytical and applied purposes. Topics include organizational structure, work processes, organizational politics, organizational design, job design, incentive systems, and quality-of-work-life programs.

ILROB 4750 Organizational Uncertainty and Tactical Leadership

Spring, seven weeks. 2 credits.
S. Bacharach.

Focuses on how leaders implement and sustain ideas in organizations during periods where it is clear that coming up with the perfect answer is impossible because of conditions of uncertainty. Specifically, the premise is that a good idea is not enough. What you need are the tactical skills to mobilize, implement, and sustain the idea throughout the organization. These tactical skills are the focus of the seminar. Through a series of examples and structured cases, students learn the skills of mobilization, coalition formation, and execution. There is a specific concern about how leaders need to anticipate reaction of others, analyze the political terrain in their organizations, and establish credibility. Leadership is examined not from the perspective of personality but from the perspective of practical skills that can be learned. These skills are applied to numerous types of organizations. There is case material, a required film, and tutorials. The class is broken up into six groups and grades assigned on the basis of group exercises and one final group project. An effort is made to balance the class equally between graduate and undergraduate students. Please note that the final project is a comprehensive case development in which each group must extensively illustrate many of the arguments presented in the course. The final illustrates many of the arguments presented in the course.

ILROB 4950 Honors Program

Fall and spring (yearlong). 3 credits each semester.

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILROB 4970-4980 Field Research, Internship

Fall and spring. 4 and 8 credits.

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILROB 4990 Directed Studies

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILROB 5200 Organizational Behavior

Fall or spring. 3 credits. Staff.

Survey of concepts, theories, and research from the fields of sociology, psychology, and social psychology as these relate to the behavior of individuals, groups, and work organizations. Topics include: job attitudes, motivation, leadership and power, group formation, organizational structure, and interorganizational relations. This course is designed for students in professional programs.

ILROB 5210 Organizational Design, Culture, and Change

Fall. 3 credits. Prerequisite: ILROB 5200.
M. Besharov.

The goal of this course is to expose students to some of the central challenges in designing effective organizations, shaping organizational culture, and leading organizational change.

The course draws on theory and research from sociology and related disciplines. Course material also includes case studies and interactive exercises.

ILROB 5250 Organizational Behavior

Fall, spring. 4 credits. Offered only in New York City for M.P.S. program. Staff.

Applies theories and methods from the behavioral sciences to the analysis of behavior in organizations. Areas of study include classical and modern theories of organization and their underlying assumptions of human nature, the relationship between organizations and their environment, the role of power, politics, and decision-making in organizations, industrial history, and leadership culture.

ILROB 5790 Negotiation and Conflict Resolution

Fall. 4 credits. Course fee: \$31, which includes cases for in-class simulations, online Negotiation Style Survey, and individualized assessment report.
M. Williams.

Provides understanding of the theory and the processes of negotiation as practiced in a variety of organizational settings. The course is designed for relevance to the broad spectrum of bargaining problems faced by the manager and the professional. It allows students the opportunity to develop negotiation skills experientially and to understand negotiation by using analytical frameworks. General topics include: distributive bargaining, integrative negotiations, psychological biases, sources of power, and multi-party negotiations. Advanced topics include: dispute resolution, emotionally intelligent negotiations, team on team negotiations (e.g., union-management, mergers). Simulations, exercises, role-playing, and cases are emphasized.

ILROB 6202 Political Leadership and Managerial Competence in Organizations

Spring; seven-week course. 2 credits.
S. Bacharach.

The capacity to lead politically is a talent often not made explicit. All too often we're not clear where politics ends and management begins and vice versa. This course will try to clarify these issues. Will focus on key political skills that are necessary in getting agendas put in place in organizations. Making use of historical figures as well as contemporary examples, this course with empirically and theoretically frame the issue of political skills. Students will be required to write a paper on one political leader and evaluate his or her political skills based on the material presented in this course. Among the leaders to be discussed will be Lincoln, Gandhi, FDR, LBJ, etc. Readings will include Machiavelli's *The Prince*, as well as current texts on leadership. Taught via distance video technology.

ILROB 6221 Dialogues on Diversity: Learning to Work Cross-Culturally

Spring; seven-week course. 2 credits.
Prerequisite: permission of instructor.
W. Sonnenstuhl.

Consist of a series of dialogues between ILR and ESCP-EAP faculty members about diversity-related issues and learning to work with one another in diverse groups. Each session will be organized as a dialogue between two faculty members. The dialogue will highlight the similarities and differences between American and European ideas and provide students with opportunities to examine how those may be applied to work

organizations. Some topics to be discussed are: What does diversity mean in the United States and Europe? How do people work in diverse international teams? What are the roles of human resource managers in implementing diversity in the United States and Europe? How does immigration impact diversity in the United States and Europe? How do we negotiate across cultures? What does leadership mean in an international workplace? Students will work as part of a U.S.-European team on projects.

ILROB 6250 Conflict, Power, and Negotiation

Fall. 4 credits. Limited enrollment.

Prerequisite: senior or graduate standing; permission of instructor. E. Lawler.

Theoretical seminar that adopts a power perspective on bargaining and conflict resolution. Examines how power relations and power processes affect tactics in bargaining and also when power relations inhibit or promote conflict resolution. "Power" is viewed in the course as a capability, embedded in a social structure, and tactics are the action based on or using such power. The seminar gives an overview of several theoretical approaches to conflict and bargaining (e.g., rational choice, cognitive, social exchange) and places the power perspective in this context.

ILROB 6251 Building Commitment to Groups and Organizations

Fall. 4 credits. Prerequisite: ILROB 5200 and permission of instructor. E. Lawler.

Graduate seminar intended for Masters in Industrial and Labor Relations (MILR) students. Uses sociological and social psychological theories to understand the foundations of commitment, cohesion, and solidarity in groups and organizations. Topics include the role of rational choice, social dilemmas, trust, social exchange, norms, affect, and social identity. Students read and discuss theoretical/conceptual material in the first half or so of the course; during the second half, they present papers that apply one or more of the theories to a case of their choosing.

ILROB 6260 Organizations and Social Inequality

Spring. 4 credits. P. Tolbert.

Examines the central role that organizations in industrial societies play in allocating income, status, and other resources to individuals. A variety of theoretical explanations of social inequality are examined, and the social policy implications of each are considered.

ILROB 6270 Leadership in Organizations

Spring. 4 credits. Prerequisite: graduate standing; seniors by permission of instructor. T. Hammer.

Examination of theories and research findings from the behavioral sciences that are relevant to leadership and the influence process in groups and organizations. Discusses personality, situational factors, intergroup processes, interpersonal perception as well as the motivation to both lead and follow. Explores the implications for leadership training, organization development, and action research.

ILROB 6710 Work, Health, and Health Care

Spring. 4 credits. Prerequisite: permission of instructor. W. Sonnenstuhl.

The health care industry is the fastest growing segment of the U.S. economy. Examines the

interplay between business organizations, which fund employee health insurance, and health. The first half of the course will focus on U.S. organizations with topics ranging from corporate culture and power to the structure of work in health care organizations. For instance, we will examine how power and corporate culture influence the definition of health, employee attention to safety, and employee willingness to use wellness programs. The second half of the course will shift to an international comparative analysis of work, health, and health care in countries with differing institutional environments, including Canada, the United Kingdom, Germany, and Korea.

ILROB 6790 Methods of Observation and Analysis of Behavior

Fall or spring. 4 credits. Limited to 25 students. Prerequisite: permission of instructor. W. Sonnenstuhl.

Focuses on qualitative methods and emphasizes learning by doing. Examines different approaches to the collection and analysis of data. Students learn a variety of data collection techniques for understanding individual and collective behavior, including participant observation, in-depth interviews, and working with archival materials. The course also emphasizes the constant comparative method as a basic technique for data analysis. This technique is the basis of such qualitative computer programs as Ethnograph and Nudist. Students conduct their own research projects. Students who wish to use qualitative methods either for a senior honors thesis, master's thesis, or doctoral dissertation are encouraged to take this course.

ILROB 7210 Advanced Micro Organizational Behavior

Spring. 3 credits. Staff.

Examines the historical development of psychological theories of organizational behavior and contemporary issues in micro organizational research. Emphasizes reading and analysis of primary source material.

ILROB 7220 Advanced Macro Organizational Behavior

Fall. 3 credits. Prerequisite: ILROB 5200. Staff.

Examines the historical development of sociological theories of organizations and contemporary issues in macro organizational research. Emphasizes reading and analysis of primary source material.

ILROB 7240 Managing Social Influence

Fall. 3 credits. J. Goncalo.

Survey of basic theories of social influence and how they are applied (and sometimes misapplied) to managing people in organizations. Theories covered include social facilitation, social norms, group polarization, conformity and minority influence. Emphasizes the evaluation of certain popular management techniques in light of social influence processes.

ILROB 7250 Analysis of Published Research in Organizational Behavior

Fall. 3 credits. Prerequisites: ILROB 5200 and one year of statistics. Staff.

Advanced research methods course that critically examines published research papers in the field of organizational behavior in terms of research design and method as well as theory.

ILROB 7260 Selected Topics in Organizational Behavior

Fall. 3 credits. Prerequisites: ILROB 5200 and permission of instructor. Staff.

Advanced proseminar that seeks to develop an interdisciplinary perspective on selected topics in organizational behavior. The topics themselves change from year to year depending on participants' interests. Course is designed to allow students and the instructor to jointly pursue significant scholarly inquiry into one or more arenas of organizational theory. Emphasis is placed on exploring the relevance of tradition in related disciplines (e.g., anthropology, linguistics, philosophy, sociology) that may enrich our understanding of organizational life.

ILROB 7270 Leadership in Organizations

Fall or spring. 3 credits. Open to MLR graduates. T. Hammer.

Covers basic leadership theories with an emphasis on how they are used, analyzes leadership cases, and examines current leadership surveys and training material. To allow you to gain additional information of practical use, you also have at the end of the semester a collection of essays on two practical topics: how to read and use leadership "best-sellers" (the kind of book that sells in airports), and leadership philosophies and management practices in foreign countries.

ILROB 7280 Theories of Motivation and Leadership

Spring. 4 credits. Prerequisite: ILROB 5200. T. Hammer.

Introduction to basic concepts of human motivation in general, with particular emphasis on the theories that explain and predict work motivation. Students examine the empirical research that tests the validity of the theories and shows how and under what conditions different motivation models can be used for practice in work organizations. Several current microtheories of leadership and power and related research are examined. The disciplinary perspective employed is social organizational psychology, and the level of analysis emphasized is action and experience of individuals in groups.

ILROB 7290 Organizational Change and Intervention

Fall. 3 credits. Prerequisite: graduate standing.

Seminar concerned with planned and unplanned change in organizations. It is designed to analyze theory in practice. Particular attention is paid to the role of internal and external change agents. Students are encouraged to analyze contemporary changes such as mergers and acquisitions and workforce reductions. Participants submit weekly workforce journals.

ILROB 7780 Solidarity in Groups (also SOC 7780)

Fall. 3 credits. Prerequisite: M.S. and Ph.D. candidates in department. All M.S. and Ph.D. candidates in department at work on their theses are strongly urged to enroll. S-U grades only. E. Lawler.

It analyzes contemporary theories of group solidarity. Particular attention is given to the comparison of rational choice, social exchange, and normative/affective explanations for the development and maintenance of social solidarity at both the micro (group) level and macro (organizational) level. Trust, emotion, social

identities also are analyzed in the context of these approaches. Most of the theoretical work covered in the course falls within the sociological tradition.

ILROB 7900 ILR M.P.S. Program

Fall and spring. 1-9 credits. Supervised research only for those enrolled in the ILR M.P.S. program.

ILROB 7980 Internship

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILROB 7990 Directed Studies

For description, see "Collective Bargaining, Labor Law, and Labor History."

ILROB 9200 Organizational Behavior Workshop

Fall. 2 credits. Prerequisite: M.S. and Ph.D. candidates in department. All M.S. and Ph.D. candidates in department at work on their theses are strongly urged to enroll. S-U grades only. Staff.

This workshop is designed to provide a forum for the presentation of current research undertaken by faculty members and graduate students in the Department of Organizational Behavior and by invited guests. Each student is expected to make at least one presentation during the year, focusing on the formulation, design, execution, and results of his or her thesis research.

SOCIAL STATISTICS

J. Bunge, chair (358 Ives Hall, 255-8643); T. DiCiccio, M. L. Karns, P. Velleman, and M. Wells

ILRST 2100 Introductory Statistics (also STSCI 2100)

Fall, spring, and summer. 4 credits.

Prerequisite: introductory algebra. L. Karns, P. Velleman, and M. Wells.

Statistics is about understanding the world through data. We are surrounded by data, so there is a lot to understand. Covers data exploration and display, data gathering methods, probability, and statistical inference methods through contingency tables and linear regression. The emphasis is on thinking scientifically, understanding what is commonly done with data (and doing some of it for yourself), and laying a foundation for further study. You will learn to use statistical software, and to use simulation tools to discover fundamental results. Will use computers regularly; the test includes both multimedia materials and a software package. This course does not focus on data from any particular discipline, but will use real-world examples from a wide variety of disciplines and current events.

ILRST 2130 Research Strategies and Regression Analysis

Fall. 3 credits. Limited to 20 students. Prerequisite: ILRST 2100 or equivalent. L. Karns.

Builds on the introduction to statistics course by considering multivariate regression methods. Application of the methods is explored through the analysis of data found by each student. Topics include: regression inference, indicator variables, analysis of outliers, interaction terms, interpretation, and presentation. Analysis process and interpretation will be emphasized rather than

specific research results. Students will present their final models in class.

ILRST 2150 Statistical Applications in Law and Policy

Fall. 4 credits. Prerequisite: ILRST 2100. Sophomore writing course. L. Karns.

The practical aspects of quantitative research in law and policy (occupational and environmental health, product liability, and employment discrimination). Students will evaluate the existing literature on a topic, analyze statistical merits, and make quantitative arguments. Standards of evidence will be considered. Required weekly writing assignments, a preliminary paper, and a final paper. Final oral presentations.

ILRST 2200 Occupational Epidemiology

Fall. 3 credits. Prerequisite: ILRST 2100 or equivalent. L. Karns.

Occupational epidemiology is the investigation of workplace health issues requiring knowledge of medicine, organizational structures, industrial hygiene, and human behavior. An introduction to occupational epidemiology through exploration of research design (cohort, case-control, and cross-sectional), exposure assessment, and statistical evaluation of the health issue. Students will use odds ratios, relative risk, and logistic regression models to measure the relationship between exposure and outcome. All students will select a topic area of interest, summarize current knowledge, and develop a research design protocol for future implementation.

ILRST 3100 Statistical Sampling (also BTRY 3100)

Fall. 4 credits. Prerequisite: two semesters of statistics. J. Bunge.

Theory and application of statistical sampling, especially in regard to sample design, cost, estimation of population quantities, and error estimation. Assessment of nonsampling errors. Discussion of applications to social and biological sciences and to business problems. Includes an applied project.

ILRST 3120 Applied Regression Methods

Fall. 4 credits. Prerequisite: ILRST 2100 or equivalent. P. Velleman.

Reviews matrix algebra necessary to analyze regression models. Covers multiple linear regression, analysis of variance, nonlinear regression, and linear logistic regression models. For these models, least squares and maximum likelihood estimation, hypothesis testing, model selection, and diagnostic procedures are considered. Illustrative examples are taken from the social sciences. Computer packages are used.

[ILRST 4070 Principles of Probability and Statistics (also BTRY 4070)]

Fall. 4 credits. Next offered 2010–2011. Staff.

For description, see BTRY 4070.]

ILRST 4100 Techniques of Multivariate Analysis (also BTRY 4100)

Spring. 4 credits. Prerequisite: ILRST 3120 or equivalent; some knowledge of matrix notation. Staff.

Discusses techniques of multivariate statistical analysis and illustrates them using examples from various fields. Emphasizes application, but theory is not ignored. Deviation from assumptions and the rationale for choices among techniques are discussed. Students are expected to learn how to thoroughly analyze real-life data sets using computer-packaged

programs. Topics include multivariate normal distribution, sample geometry and multivariate distances, inference about a mean vector, comparison of several multivariate means, variances, and covariances; detection of multivariate outliers; principal component analysis; factor analysis; canonical correlation analysis; discriminant analysis; and multivariate multiple regression.

[ILRST 4110 Statistical Analysis of Qualitative Data (also BTRY 6030)]

Spring. 4 credits. Prerequisite: two statistics courses or permission of instructor. Next offered 2010–2011. T. DiCiccio.

Advanced undergraduate and beginning graduate course. Includes treatment of association between qualitative variates; contingency tables; log-linear models; binary ordinal and multinomial regression models; and limit dependent variables.]

[ILRST 4140 Statistical Methods: Applied Design (also BTRY 6040)]

Fall. 3 credits. Prerequisites: ILRST 2100, 2130, or ILRST 5100, 5110, or equivalent. Next offered 2010–2011. T. DiCiccio.]

ILRST 4990 Directed Studies

For description, see “Collective Bargaining, Labor Law, and Labor History.”

ILRST 5100 Statistical Methods for the Social Sciences I

Fall. 3 credits. T. DiCiccio.

A first course in statistics for graduate students in the social sciences. Descriptive statistics, probability and sampling distributions, estimation, hypothesis testing, simple linear regression, and correlation. Students are instructed on the use of a statistics computer package at the beginning of the term and use it for weekly assignments.

ILRST 5110 Statistical Methods for the Social Sciences II

Fall and spring. 3 credits. Prerequisite: ILRST 5100 or equivalent introductory statistics course. T. DiCiccio.

Second course in statistics that emphasizes applications to the social sciences. Topics include simple linear regression; multiple linear regression (theory, model building, and model diagnostics); and the analysis of variance. Computer packages are used extensively.

ILRST 5150 Statistical Research Methods

Fall or spring. 4 credits. Offered only in New York City for M.P.S. program. Staff.

Students learn basic skills for conducting qualitative and survey research. They work through an introductory review course at home on their own time. After passing an exam, they attend a two-week immersion course in Ithaca taught by the on-campus faculty in July. Topics include an introduction to surveys and discrete analysis, basic regression, and integration of qualitative and quantitative research methods.

ILRST 6140 Structural Equations with Latent Variables

Fall. 3 credits. Prerequisites: ILRST 2100/5100/5110 or equivalent. M. Wells.

Provides a comprehensive introduction to the general structural equation system, commonly known as the “LISREL model.” One purpose of the course is to demonstrate the generality of this model. Rather than treating path analysis, recursive and nonrecursive models, classical econometrics, and confirmatory factor analysis

as distinct and unique, we will treat them as special cases of a common model. Another goal of the course is to emphasize the application of these techniques.

ILRST 6190 Special Topics in Social Statistics

Spring. 3 credits. Prerequisite: ORIE 6700 or equivalent. A. Vidyashankar.

The areas of study are determined each semester by the instructor offering the seminar. Topics may include: hierarchical linear models, the multivariate normal and Wishart distributions, multivariate sampling, tests of mean and covariance, multivariate regression, principal components, factor analysis, canonical correlation, robustness, and bootstrap confidence regions and tests.

[ILRST 7150 Likelihood Inference]

Fall. 3 credits. Prerequisite: graduate courses equivalent to ORIE 6700. Next offered 2010–2011. T. DiCiccio.

In most statistical models, exact distribution theory for testing hypotheses or constructing confidence intervals is either unavailable or computationally cumbersome. Inferences are routinely performed by using large-sample approximations to the distributions of test statistics. This course provides a survey of some recent higher-order asymptotic approximations for likelihood-based methods of inference.]

[ILRST 7170 Analysis of Longitudinal Data]

Spring. 3 credits. Prerequisites: extensive knowledge of SAS; advanced linear models; probability and statistics (at level of text by Casella and Berger). Next offered 2010–2011. A. Vidyashankar.

Comprehensive introduction to analysis of longitudinal data. Involves modeling, analysis, and a diagnostic components. Modeling and methodology for analysis of missing data are also incorporated.]

ILRST 7990 Directed Studies

For description, see “Collective Bargaining, Labor Law, and Labor History.”

FACULTY ROSTER

Abowd, John M., Ph.D., U. of Chicago.

Edmund Ezra Day Prof. of Industrial and Labor Relations, Labor Economics

Applegate, Ronald, Ph.D., SUNY Binghamton. Lec., Collective Bargaining, Labor Law, and Labor History

Bacharach, Samuel, Ph.D., U. of Wisconsin.

Jean McKelvey-Alice Grant Prof. of Labor Management Relations, Organizational Behavior

Basefsky, Stuart, M.L.S., U. of North Carolina. Lec., Human Resource Studies

Batt, Rosemary, Ph.D., Massachusetts Inst. of Technology. Alice Cook Professorship in Women and Work; Assoc. Prof., Human Resource Studies

Bell, Bradford, Ph.D., Michigan State U. Assoc. Prof., Human Resource Studies

Besharov, Marya, Ph.D., Harvard U. Asst. Prof., Organizational Behavior

Bishop, John H., Ph.D., U. of Michigan. Assoc. Prof., Human Resource Studies

Blau, Francine D., Ph.D., Harvard U. Francis Perkins Prof. of Industrial and Labor Relations, Labor Economics

Boyer, George R., Ph.D., U. of Wisconsin. Prof., Labor Economics

- Bronfenbrenner, Kate, Ph.D., Cornell U. Sr. Lec., Extension and Collective Bargaining, Labor Law, and Labor History
- Bunge, John A., Ph.D., Ohio State U. Assoc. Prof., Social Statistics
- Cohen, Daniel, Ed.M., Case Western Reserve U. Lec., Human Resource Studies
- Collins, Christopher, Ph.D., U. of Maryland. Assoc. Prof., Human Resource Studies
- Colvin, Alexander, Ph.D., Cornell U. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
- Compa, Lance, J.D., Yale Law School. Sr. Lec., Collective Bargaining, Labor Law, and Labor History
- Cook, Maria L., Ph.D., U. of California, Berkeley. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
- Cowie, Jefferson R., Ph.D., U. of North Carolina, Chapel Hill. Assoc. Prof., Collective Bargaining Labor Law and Labor History
- Daniel, Cletus E., Ph.D., U. of Washington. Prof., Collective Bargaining, Labor Law, and Labor History
- DeVault, Ileen A., Ph.D., Yale U. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
- DiCiccio, Thomas J., Ph.D., U. of Waterloo (Canada). Assoc. Prof., Social Statistics
- Dragoni, Lisa, Ph.D., U. Maryland. Asst. Prof., Human Resource Studies
- Dyer, Lee D., Ph.D., U. of Wisconsin. Prof., Human Resource Studies
- Ehrenberg, Ronald, Ph.D., Northwestern U. Irving M. Ives Professor of Industrial and Labor Relations and Economics, Labor Economics
- Fields, Gary S., Ph.D., U. of Michigan. Prof., Labor Economics, and International and Comparative Labor
- Freedman, Matthew, Ph.D., U. of Maryland. Asst. Prof., Labor Economics
- Givan, Rebecca K., Ph.D., Northwestern U. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
- Gold, Michael E., LL.B., Stanford U. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
- Goncalo, Jack, Ph.D., U. of California, Berkeley. Asst. Prof., Organizational Behavior
- Griffith, Kati L., J.D., New York U. School of Law. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
- Gross, James A., Ph.D., U. of Wisconsin. Prof., Collective Bargaining, Labor Law, and Labor History
- Hallock, Kevin, Ph.D., Princeton U. Assoc. Prof., Human Resource Studies
- Hammer, Tove H., Ph.D., U. of Maryland. Prof., Organizational Behavior
- Hausknecht, John P., Ph.D., Penn State U. Asst. Prof., Human Resource Studies
- Homrighouse, Christina, B.S., Ithaca Coll. Lec., Human Resource Studies
- Hurd, Richard W., Ph.D., Vanderbilt U. Prof., Extension and Public Service
- Hutchens, Robert M., Ph.D., U. of Wisconsin. Prof., Labor Economics
- Jackson, Clement, Ph.D., Harvard U. Asst. Prof., Labor Economics
- Jakubson, George H., Ph.D., U. of Wisconsin. Assoc. Prof., Labor Economics
- Kahn, Lawrence M., Ph.D., U. of California, Berkeley. Prof., Collective Bargaining, Labor Law, and Labor History/Labor Economics
- Karns, M. Elizabeth, J.D., Quinipiac U. Lec., Social Statistics
- Katz, Harry C., Ph.D., U. of California, Berkeley. Jack Sheinkman Prof. in Collective Bargaining, Labor Law, and Labor History
- Kuruvilla, Sarosh C., Ph.D., U. of Iowa. Prof., Collective Bargaining, Labor Law, and Labor History
- Lawler, Edward J., Ph.D., U. of Wisconsin, Madison. Martin P. Catherwood Prof., Organizational Behavior
- Lieberwitz, Risa L., J.D., U. of Florida. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
- Lipsky, David B., Ph.D., Massachusetts Inst. of Technology. Prof., Collective Bargaining, Labor Law, and Labor History
- Nishii, Lisa, Ph.D., U. of Maryland. Asst. Prof., Human Resource Studies
- Rubineau, Brian, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Organizational Behavior
- Salvatore, Nicholas, Ph.D., U. of California, Berkeley. Prof., Collective Bargaining, Labor Law, and Labor History
- Seeber, Ronald L., Ph.D., U. of Illinois. Assoc. Prof., Extension
- Smith, Robert S., Ph.D., Stanford U. Prof., Labor Economics
- Sonnenstuhl, William J., Ph.D., New York U. Assoc. Prof., Extension and Organizational Behavior
- Tolbert, Pamela S., Ph.D., U. of California. Prof., Organizational Behavior
- Turner, Lowell R., Ph.D., U. of California. Prof., Collective Bargaining, Labor Law and Labor History/International and Comparative Labor
- Velleman, Paul F., Ph.D., Princeton U. Assoc. Prof., Social Statistics
- Vidyashankar, Anand, Ph.D., Iowa State U. Assoc. Prof., Statistical Science and Social Statistics
- Wells, Martin T., Ph.D., U. of California, Santa Barbara. Prof., Social Statistics
- Williams, Michele, Ph.D., U. of Michigan. Asst. Prof., Organizational Behavior
- Wright, Patrick M., Ph.D., Michigan State U. Prof., Human Resource Studies

JOHNSON GRADUATE SCHOOL OF MANAGEMENT

ADMINISTRATION

L. Joseph Thomas, dean

Mark Nelson, associate dean for academic affairs

Douglas Stayman, associate dean for M.B.A. Program

Sunny Donenfeld, associate dean for administration

Randy Allen, associate dean for corporate relations

Rebecca Mitchell, associate dean for alumni affairs and development

Thomas B. Hambury, director of executive programs

Daniel Szpiro, director of Cornell Queens Executive M.B.A. Program

Randall Sawyer, director of admissions, financial aid and inclusion

Karin S. Ash, director of career management center

Irma Almirall-Padamsee, director of Office of Diversity and Inclusion

Amanda Shaw, director, Student Services

Ann W. Richards, associate director of admissions and financial aid

Rhonda H. Velazquez, director of student activities and special events

Kerwin-Michael Smith, college registrar

The Johnson Graduate School of Management prepares men and women for managerial careers in business. The school offers course work in many disciplines to provide potential managers with an understanding of the complexities of the professional world in which they operate and of the organizations of which they will become a part.

A bachelor's degree or its equivalent is required for admission to the two-year program leading to the master of business administration (M.B.A.) degree. Nearly half of the students have a background of undergraduate studies in arts and sciences, and about one-quarter in engineering. Five percent of the students begin their graduate training immediately after receiving their bachelor's degrees and the remaining 95 percent following work experience.

Combined degree programs allow highly qualified Cornell students to co-register in the school during their senior year, thereby earning a master's degree in less than the usual time.

The doctoral program, administered through the Graduate School, provides an advanced level of education in business for those who seek careers in teaching and research at leading universities.

More detailed information about these programs is available from the Office of Admissions and Student Affairs, Johnson Graduate School of Management, 111 Sage Hall.

Students in other graduate programs and undergraduate students registered with the university are welcome in most classes.

UNDERGRADUATE ONLY

NBA 3000 Entrepreneurship and Private Equity

Fall, spring. 3 credits. Prerequisite: non-Johnson School undergraduate students only. Johnson School and graduate students, see NBA 5640. D. BenDaniel. This course uses lectures, live case studies, and business plans written by student teams to address entrepreneurial management in start-up ventures and private equity investments. Topics include financing, valuation, growth management, and buying and selling businesses. Guest lecturers speak on specialized topics such as leveraged buyouts, distressed businesses, advice from experienced board members, and private equity deals. The course attempts to integrate marketing, finance, operations, and human resource topics in the context of high-growth business ventures and private equity.

COURSES FOR NON-JOHNSON SCHOOL STUDENTS

NBA 5070 Entrepreneurship for Scientists and Engineers

Fall, spring. 3 credits. Prerequisite: M.Eng., Ph.D., and M.S. students; priority given to seniors as undergraduates. G. Schneider. Specifically designed for mentored independent study, this course is customized using streaming video, guest speakers, distance learning, and special lectures/tutorial sessions. Work is focused on a single project: students form a start-up team and follow a technical business idea of their own choosing through the process of developing and founding a business that can attract venture investors. Learn how high-technology ideas are converted into world-class businesses in venture-backed start-up companies as well as in new business development in existing companies. Tutorial sessions with professors apply lessons to the team business plan.

NBA 5150 Leadership Theory and Practice

Fall, spring. 3 credits. M. Hostetler. This course will focus on the challenges of effective leadership in a complex world. The course has four significant parts: (1) Exploring historical and contemporary theories and models of leadership through the required text and selected articles; (2) Examining and applying the Johnson School's Leadership Model; (3) Analyzing the practical challenges of leadership through case studies, executive speakers, and company visits; (4) Developing self-awareness of the student's leadership strengths and weaknesses through the use of behavioral instruments and group exercises and creating a personal action plan for

improvement. A critical element of this course will be the coaching and feedback students will receive on their own leadership styles and behaviors from their peers and instructor.

NBA 5530 Accounting and Financial Decision Making

Spring. 3 credits. Prerequisite: non-Johnson School students. J. D'Souza, M. Shackell-Dowell.

Focuses on basic financial and managerial accounting and the economic and financial concepts that have a bearing on managerial decisions. The goals are to (1) give students a working knowledge of the accounting process and the value and limitations of the data that come out of the accounting information system; (2) familiarize students with key concepts in managerial accounting and the application of cost information to pricing and operating decisions; (3) promote an understanding of the use of economic theory in the evaluation of capital investment projects. The teaching methods consist of lectures and cases. Students are evaluated on the basis of exams.

NCC 5500 Financial Accounting

Fall, spring. 3 credits. Prerequisite: non-Johnson School students. Similar in content to M.B.A. core course NCC 5000. Staff. Introductory accounting course that examines the subject from the viewpoint of users external to the organization. Topics include transaction analysis; the accounting cycle; financial-statement preparation, use, and analysis; revenue recognition and cost measurement; present value; and problems in financial-accounting disclosure.

NCC 5530 Marketing Management

Fall, spring. 3 credits. Prerequisite: non-Johnson School students. Similar in content to M.B.A. core course NCC 5030. Staff. Addresses controllable and uncontrollable marketing variables that managers in multiproduct firms face in today's business environment. Topics include customer behavior, product planning, distribution, advertising and promotion, pricing, and competitive strategy.

NCC 5540 Management and Leading in Organizations

Spring. 3 credits. Staff. Ultimately, the goal of managers and leaders is to get things done in organizations. Most of that work is accomplished by effectively managing other people. Using text-based cases, video cases, audio cases, exercises, and readings, we will focus on the skills managers need to be successful in their firms and in their careers. An important course goal is to help you hone your critical thinking and problem-solving skills. To this end, our case analyses will require you to take problems apart into their component parts, to uncover their root causes, and to develop workable solutions. I will introduce frameworks and models that will help you analyze organizational problems and generate appropriate solutions. Major content themes focus on motivating employees, understanding

organizational design and organizational culture, persuading and influencing others, and managing change. The course is particularly relevant for students who (1) plan to work in corporations; or (2) intend to manage and lead firms; or (3) plan to work in the consulting industry; or (4) think about founding and/or owning start-up companies.

NCC 5560 Managerial Finance

Fall, spring, 3 credits. Prerequisite: non-Johnson School students. Similar in content to M.B.A. core course NCC 5060. Letter grades only. Staff.

Introduces business finance through theory and case studies. Topics include stock and bond valuation, the capital budgeting decision, portfolio theory, the asset-pricing models, raising capital, capital structure, mergers and acquisitions, costs of capital, option pricing, and risk management. International applications are considered within each topic area. Grading is based on an exam, group case reports, homework, and class participation.

NCC 5580 Managing Operations

Spring, 3 credits. Staff.

Operations Management is the design and management of the processes that transform inputs into finished goods or services. This course provides a foundation for understanding the operations of a firm. Our objective by the end of the course is to provide you with the basic skills necessary to critically analyze a firm's operating performance and practices. We will focus on how the "physics" of material, work and information flows, and the design and management of a firm's processes interact to determine a firm's cost structure and its ability to compete effectively in terms of noncost measures such as quality, variety, and speed.

NCC 5590 Strategy

Spring, 3 credits. Staff.

Among the critical tasks facing any senior manager are the creation, implementation, and evaluation of a business unit's strategy. This course seeks to provide the management student with the tools and frameworks essential to carrying out these tasks. Many of these tools and frameworks will be based on recent advances in game theory, industrial organization, and organization theory, although the course will also draw from the older business policy tradition. Students who successfully complete this course will be able to analyze industries, identify areas of strategy advantage and disadvantage, and devise strategies that exploit advantages and remedy disadvantages.

IMMERSIONS

Only the Johnson School offers learning immersion courses in strategic operations, managerial finance, investment banking, brand management, and entrepreneurship. Immersions offer a semester of continuous focus, real-world problem solving, and site visits to dozens of companies.

MFI—Managerial Finance Immersion

Prerequisite: NCC 5060 with grade of B or better.

Specifically designed for students planning to pursue finance careers. Some students interested in nonfinance careers (including consulting) may wish to consider this course, but they should recognize that it is not specifically designed for this purpose. A major objective is to help students make more informed choices about how to launch their finance careers.

NBA 5020 Managerial Cost Accounting 3 credits

NBA 5060 Financial Statement Analysis 1.5 credits

NBA 5490 Managerial Finance— Practicum 2.0 credits

NBA 5580 Corporate Financial Policy 1.5 credits

NBA 5650 Corporate Governance 1.0 credit

NBA 6560 Valuation Principles 1.5 credits

NCC 5040 Managing and Leading in Organizations 2.5 credits

NCC 5080 Managing Operations 2.5 credits

IBI—Investment Banking Immersion

Prerequisite: NCC 5060 with grade of B or better.

Specifically designed for students planning to pursue careers in investment banking. Inappropriate for students interested in following a finance career in nonfinancial industry or nonfinance careers (including consulting).

This course is designed to meld the practical and theoretical aspects of the field. A great deal of interaction and discussion is expected between students, participating faculty, and visiting practitioners. While the course is designed to make its students more attractive as candidates for employment in the investment banking profession, and it is expected that some of the participating firms will be using their visits to identify candidates for summer internships, obtaining relevant summer internships remains the responsibility of the students.

NBA 5000 Intermediate Accounting 3.0 credits

NBA 5110 Financial Modeling 1.5 credits

NBA 5560 Investment Banking— Practicum 2.5 credits

NBA 5580 Corporate Financial Policy 2.5 credits

NBA 6560 Valuation Principles 1.5 credits

NCC 5040 Managing and Leading in Organizations 2.5 credits

NCC 5080 Managing Operations 2.5 credits

CMAM—Capital Markets and Asset Management

Prerequisite: NCC 5060 with grade of B or better.

Specifically designed for students planning to pursue careers in research (both buy-side and sell-side), sales, and trading, either at Wall Street firms (sell-side) or at buy-side firms such as mutual funds. Melds the practical and theoretical aspects of the field. A great deal of interaction and discussion is expected between students, participating faculty, and visiting practitioners. While the course is designed to make its students more attractive as candidates for employment in the investment management profession, and it is expected that some of the participating firms will use their visits to identify candidates for summer internships, obtaining relevant summer internships remains the responsibility of the students.

NBA 5420 Investment and Portfolio Management 3.0 credits

NBA 5830 Capital Markets and Asset Management Practicum 2.5 credits

NBA 6560 Valuation Principles 1.5 credits

NCC 5040 Managing and Leading in Organizations 2.5 credits

NCC 5080 Managing Operations 2.5 credits

Highly recommended courses for CMAM Immersion:

NBA 5000 Intermediate Accounting 3.0 credits

NBA 5060 Financial Statement Analysis 1.5 credits

NBA 5110 Financial Modeling 1.5 credits

NBA 6730 Derivatives I 1.5 credits

SMI—Strategic Marketing Immersion

Limited enrollment. Prerequisites: NCC 5000, 5010, 5020, 5030, and 5060; permission of instructor.

Full-time program for the semester; students are not able to take other courses concurrently. The course objective is to begin developing students to think and act like brand managers, some of the best trained and most upwardly mobile professionals in industry. It provides students with a unique opportunity to begin internalizing the concepts, principles, and tools necessary to achieve success in brand management. While the course focuses on managing traditional consumer brands, high-tech products, services, and global branding are also addressed. In-class methods consist of (1) academic and industry lecturers; (2) on-site visits with marketing and manufacturing professionals; (3) case and project discussions and presentations; and (4) a brand management simulation. Course requirements consist of (1) discussion of readings; (2) individual case write-ups and presentations; (3) group projects and presentations (including a capstone simulation); and (4) in-class exams. There is considerable off-campus travel for field study.

NBA 5020 Managerial Cost Accounting
3 credits

NBA 6200 Marketing Research
3 credits

**NBA 6240 Brand Management—
Practicum**
4.5 credits

**NCC 5040 Managing and Leading in
Organizations**
2.5 credits

NCC 5080 Managing Operations
2.5 credits

SSO—Semester in Strategic Operations

Limited enrollment. Prerequisites: NCC 5010 and 5060 for Johnson School students; permission of instructor.

Full-time program for the semester; students cannot take other courses concurrently. The course is concerned with the integration of technological, human-resource, logistical, and financial considerations to produce a manufacturing enterprise that can respond quickly and effectively to market requirements. The course is taught by a team of faculty and industrial practitioners, and much of the student work is team oriented. There is off-campus travel for field study of various manufacturing plants.

NBA 5020 Managerial Cost Accounting
3 credits

**NBA 6410 Logistics and Manufacturing
Strategy**
3 credits

**NBA 6500 Semester in Strategic
Operations Practicum**
4.5 credits

**NCC 5040 Managing and Leading in
Organizations**
2.5 credits

NCC 5080 Managing Operations
2.5 credits

E&PE—Entrepreneurship and Private Equities Immersion

Comprehensive course that integrates the technical, strategic, and economic aspects of entrepreneurship; is the student's full course load for the semester. David J. BenDaniel, the Don and Margi Berens Professor of Entrepreneurship at the Johnson School, leads the faculty team for this immersion.

NBA 5020 Managerial Cost Accounting
3.0 credits

**NBA 5320 Due Diligence in Private
Equity Investments**
0.5 credits

**NBA 5590 Venture Capital Industry and
Private Equity Markets**
0.5 credits

**NBA 5640 Entrepreneurship and Private
Equity—Practicum**
3 credits

NBA 6530 Strategic Alliances
1.0 credit

NBA 6560 Valuation Principles
1.5 credits

**NCC 5040 Managing and Leading in
Organizations**
2.5 credits

NCC 5080 Managing Operations
2.5 credits

SGE—Sustainable Global Enterprise

The SGE immersion provides students with a breadth and depth of knowledge and experience relating to the broad impact of social and environmental issues as well as the strategic opportunity these issues present to firms across a number of industries. Students will spend much of their time in field projects that require them to address real problems currently being faced by companies who expect to receive practical, operational solutions.

NBA 6030 Sustainable Global Enterprise
1.5 credits

**NBA 6580 Sustainable Global Enterprise
Practicum**
3.5 credits

**NCC 5040 Managing and Leading in
Organizations**
2.5 credits

NCC 5080 Managing Operations
2.5 credits

*Note: Students electing to take the immersion must choose a minimum of five (5) additional credits of course work from the recommended electives list of Johnson School courses or other courses from other programs at Cornell. Course availability is subject to scheduling.

NCC COMMON CORE COURSES

NCC 5000 Financial Accounting

Fall. 2.5 credits. Johnson School core course. Limited enrollment. Non-Johnson students see NCC 5500. R. Libby. Introductory accounting course that examines the subject from the viewpoint of users external to the organization. Topics include transaction analysis; the accounting cycle; financial-statement preparation, use, and analysis; revenue recognition and cost measurement; present value; and problems in financial-accounting disclosure.

NCC 5010 Statistics for Management

Fall. 2.5 credits. Johnson School Core Course. Limited enrollment. A. Farahat. This course provides the foundations of probability and statistics required for a manager to interpret large quantities of data and to make informed decisions under uncertainty. Topics covered include decision trees, sampling, hypothesis testing, and multiple regression.

NCC 5020 Microeconomics for Management

Fall. 2.5 credits. Johnson School core course. Limited enrollment. R. Frank and M. Waldman. Introduces microeconomic theory and applies it to problems faced by managers. Topics include supply and demand, consumer behavior, pricing when a firm has market power, and the role of contracts. The course employs a lecture format and emphasizes problem solving. Grading is based on a midterm and a final exam.

NCC 5030 Marketing Management

Fall. 2.5 credits. Johnson School core course. Limited enrollment. Non-Johnson students see NCC 5530. S. Gupta and V. Narayan.

Designed to convey the key concepts of marketing and how they fit into the larger context of management strategy and decisions. Presents both the practical "how" and the fundamental "why" of marketing activities in the light of contributions from behavioral science, economics, and statistics. The goals are to provide sufficient understanding for those who need only to interact with the marketing function, as well as communication concepts and developing processes that can provide the foundation for further course work and future experience in marketing. The course makes extensive use of case materials.

NCC 5040 Managing and Leading in Organizations

Spring. 2.5 credits. Johnson School core course. Limited enrollment. Non-Johnson students see NCC 5540. K. O'Connor and S. Spataro.

Stories are central to how we know and remember events, people, and facts and to how we communicate knowledge and history. Most of the jobs we aspire to involve a particular form of storytelling—the CEO's vision, the analyst's report, the planner's strategy, the salesperson's pitch, the consultant's analysis, and the manager's brand. What distinguishes these as business stories is that they are often analytical (based on a set of objective facts and statistics) and reflect a deep understanding of the complex interactions of individuals and organizations. This course has two goals: (1) to make students appreciate the complexity of the issues that often arise in organizations, and (2) to develop and refine students' analytical storytelling abilities. To achieve these goals, the course is taught by the case-study method, an efficient way to expand the student's experience base with respect to such issues as motivation, power, leadership, ethics, structure, design, and change. Students learn how to make good inferences about what will and won't work in particular situations, and how to learn from their own experiences and those of others.

NCC 5060 Managerial Finance

Fall. 2.5 credits. Johnson School core course. Limited enrollment. Non-Johnson students see NCC 5560. R. Michaely. Introduces students to the basic concepts of finance. In particular, the course addresses what type of investments firms and individuals should take on and how these investments should be financed. Understanding these concepts is essential to financial managers and professional investors and has important applications to many aspects of financial decisions all of us have to make on a daily basis (e.g., is getting an M.B.A. a good investment?). These issues involve capital budgeting decisions, stock and bond valuation, how to assess and account for risk through the capital asset pricing model (CAPM), option pricing, capital structure and cost of capital, and market efficiency. Grading is based on exams, quizzes, group case reports, homework, and class participation.

NCC 5080 Managing Operations

Spring, 2.5 credits. Johnson School core course. Limited enrollment. Prerequisite: NCC 5010 or permission of instructor. Non-Johnson students see NCC 5580. N. Gavirneni and V. Gaur.

Focuses on managing processes: actions that convert inputs into outputs. Almost any business function can be modeled as a network of processes. The first part of the course examines processes, both individually and as part of a larger system; students see that good process design reflects both the volume and the variety of the product. A common course theme is the deleterious effect of variability (in demand, supply, quality, or capacity) in complex systems. Queuing theory and simulation are particularly helpful for analyzing process capabilities. The second part analyzes how goods and services are produced. After describing the strategic role of operations, it examines forecasting systems, inventory management, and just-in-time and logistic management. Constrained optimization models provide information about managing with finite resources. The final part examines process improvement through quality and productivity management and corporate learning.

NCC 5090 Strategy

Fall, 2.5 credits. Johnson School core course. Limited enrollment. Non-Johnson students see NCC 5590. V. Kadiyali and H. Schneider.

Among the critical tasks facing any senior manager are the creation, implementation, and evaluation of a business unit's strategy. This course seeks to provide the management student with the tools and frameworks essential to carrying out these tasks. Many of these tools and frameworks are based on recent advances in game theory, industrial organization, and organization theory, although the course also draws from the older business policy tradition. Students who successfully complete this course are able to analyze industries, identify areas of strategy advantage and disadvantage, and devise strategies that exploit advantages and remedy disadvantages.

NBA MANAGEMENT ELECTIVE COURSES

Accounting

NBA 5000 Intermediate Accounting

Spring, 3 credits. Prerequisite: NCC 5000 or equivalent. M. Nelson and R. Swieringa. This course is relevant to a general business career, but is particularly relevant to careers that involve the use of financial statements. Our objective is to enable you to become more knowledgeable, skeptical consumers of financial information by teaching you to (1) understand and be able to reconstruct the accounting that produced the numbers you see in financial statements and the financial press, and (2) anticipate circumstances where financial information is likely to be biased or imprecise, in part by understanding the alternatives that were available at the time that a choice among accounting treatments was made. This objective will be achieved by a combination of lectures and analyzing and discussing articles from the financial press and cases that are based on actual financial statements.

NBA 5010 Taxes and Business Strategy

Spring, 1 credit. Prerequisites: NCC 5000 and NCC 5060. E. Maydew.

Part of being financially savvy is having an understanding of how taxation affects business decisions; e.g., forming a corporation and raising capital, operating the firm, distributing cash to shareholders through dividends and share repurchases, expanding through acquisition, and divesting lines of business. Taxes have a direct impact on cash flow and often divert 30 to 40 percent of the firm's pretax cash flow to the government, effectively making the government the single largest stakeholder in many firms. Having an understanding of taxation and how firms plan accordingly is important for just about any career path you choose, whether you will be an investment banker, venture capitalist, consultant, money manager, CFO, treasurer, controller, taking over a family-owned business, or an entrepreneur setting up a new business. Topics include tax planning fundamentals, corporate tax fundamentals, taxation of mergers and acquisitions, taxation of divestitures, international taxation, taxes and wealth planning.

NBA 5020 Managerial Cost Accounting

Fall, spring, 3 credits. Prerequisites: NCC 5000, 5010, and 5020, or equivalent.

R. Hilton and R. Bloomfield.

Designed both for those responsible for internal accounting information and those who use such information for decision making and performance evaluation. Course topics include budgeting, product costing systems, activity-based costing, activity-based management standard costing, cost variance analysis, cost estimation and prediction, cost-volume-profit analysis, responsibility accounting, performance evaluation, non-manufacturing cost analysis, cost allocation, and transfer pricing. Instruction is a mixture of lecture and case discussion. Student evaluation is based on a midterm exam, a final exam, and class participation.

NBA 5030 Strategic Cost Management

Fall, 1.5 credits. Prerequisite: NBA 5020 or permission of instructor. R. Hilton.

Focuses on the concepts and tools of cost management systems and the relationship of cost management to an organization's strategy. Based on cases that explore the use of cost management concepts and tools in a variety of organizations. Course topics include target costing, process value engineering, Kaizen costing, cost reduction, continuous improvement, cost-quality-functionality trade-offs, construction and implementation of a balanced scorecard, activity-based costing, activity-based management, identification of value-added and non-value-added costs, and the value chain. Instruction is based on the presentation and discussion of cases. Student evaluation is based on a case presentation, a final case write-up, and class participation.

NBA 5060 Financial Statement Analysis

Fall, spring, 1.5 credits. Prerequisite: NCC 5060, NBA 5000 (or concurrent enrollment), or permission of instructor. N. Yehuda and C. Nichols.

Develops a set of core skills essential to financial statement analysis. Covers strategic ratio analysis, cash flow analysis, pro forma financial statements, financial modeling, credit analysis, bond rating and bankruptcy predictions, and firm valuation using discounted cash flow techniques. Emphasizes practical applications. The course format is a

combination of case studies and lectures. The lectures communicate subtler aspects of the material while the cases provide hands-on experience.

NBA 5090 Advanced Financial Statement Analysis

Fall, 1.5 credits. Prerequisites: NBA 5060, finance immersion course, or permission of instructor. Not open to students who have completed 3-credit version of NBA 5060. N. Yehuda.

Builds on the core financial analysis skills developed in NBA 5060. Topics include trading strategies, relative (multiple) valuation, mergers and acquisitions-consolidated statements, deal structure, strategic deal pricing, joint ventures and alliances, holding companies and segments, credit and bankruptcy analysis. The overall focus is on using accounting-based information to make investment decisions. The class is case based with a strong emphasis on practical applications. There is no final exam.

NBA 5110 Financial Modeling

Fall, spring, 1.5 credits. Prerequisites: NBA 5060 or permission of instructor; mastery of basic Excel skills. J. D'Souza and C. Nichols.

Financial modeling is the art and science of constructing spreadsheet models of firms' future financial statements. This course builds on the brief introduction to financial modeling in NBA 5060 by modeling the effect on the income statement, balance sheet, and statement of cash flows of more complicated financial transactions such as leveraged buyouts, mergers and acquisitions, and corporate reorganizations. The class meets in the state-of-the-art Parker Center computer lab, and active student participation is emphasized.

NBA 6060 Evaluating Capital Investment Projects

Spring, 1.5 credits. Prerequisites: NCC 5060. M. Leary.

This course focuses on the financial-economic analysis of corporate investment decisions. One of the most important decisions a firm makes is how to best allocate its capital resources. Both financial and nonfinancial managers alike need to be able to analyze and communicate the value impact of proposed capital expenditures and strategic decisions. Using both financial theory and case examples, we will explore such topics as discounted cash flow analysis, alternative decision criteria, mutually exclusive investments, lease vs. buy decisions, monte-carlo simulation and real options. This course is especially useful to anyone preparing for a career role with input to business investment decisions, including marketing, operational and corporate financial managers.

Economics

NBA 5240 Macroeconomics and International Trade

Fall, spring, 3 credits. Prerequisite: NCC 5020 or equivalent or permission of instructor. O. Heffetz and I. Azis.

Applies basic macroeconomic theory to such problems as inflation, unemployment, economic growth, and productivity and examines how those problems interact with international trade and finance. Students learn to be informed observers of national and international economic policies and discerning users of economic analyses and forecasts. Uses a lecture/discussion format.

NBA 5270 Applied Economic Analysis

Spring, 4 credits. B. Ho.

Emphasizes how economic analysis can help firms and individuals make the most of their opportunities. Of special interest to managers and consultants is the focus on examples that illustrate how faulty economic reasoning leads to inefficient outcomes. Also emphasizes strategic thinking and instructs students in the art of "economic naturalism"—the use of economic reasoning to understand and explain everyday patterns of individual and firm behavior.

Entrepreneurship**NBA 5190 Sustainability as a Driver for Innovation in the Entrepreneurial Organization**

Spring, 1 credit. F. Keller.

This one credit eight-session course will give the student an overview of the emerging sustainable business model. Using the teacher's business as an example along with appearances from other business leaders, the class focuses on principles of Sustainability and how leaders are transforming their own organizations. While the U.S. version of capitalism has succeeded in providing unprecedented wealth throughout the 20th century, this class will evaluate the potential of "tweaking" capitalism to benefit not only the owners but the whole of society in a manner different than "trickle" economy. Using the Hegelian notion of thesis, antithesis, and synthesis, this class will explore capitalism as practiced today as the thesis. The antithesis will be from environmental and social movement concepts. The principles of sustainability will be synthesized as the potential "new normal" for business in the future. Students will learn that in addition to traditional financial analysis, business decisions can benefit from taking into account the impacts of social capital and ecological capital as well. Students will learn using dialogue and presentations about actual cases and the logic of how the sustainable business model is being constructed.

[NBA 5300 Entrepreneurship Lab

Fall, 3 credits. Prerequisites: M.B.A. students; NBA 5640 or concurrent enrollment or permission of instructor. G. Schneider.]

NBA 5320 Due Diligence in Private Equity Investments

Spring, 0.5 credits. D. BenDaniel.

This is an arranged course featuring expert practitioners covering the following topics: Integrating Strategic Planning into Private Equity Due Diligence, Operational Due Diligence, Effective People and Organizational Due Diligence, Review of Non-Compete and Other Key Agreements, Legal Due Diligence, Tax Planning, and Financial and Accounting Due Diligence. Because of the large enrollment expected and at the request of the visiting faculty, only students who are prepared to attend all the required sessions will be admitted and can receive credit for the course.

NBA 5570 Case Studies in Venture Investment and Management

Fall, 1.5 credits. D. BenDaniel.

Consists of a series of cases that focus on the venture capital investment process and the subsequent management of such ventures. The primary perspective is that of the venture capitalist in assembling and evaluating

information, preparing forecasts, assessing risks, developing and negotiating investment structure and terms, and deciding whether to invest. Cases also focus on management and financial problems and on policy issues and the relationship between venture capitalists and entrepreneurs. The secondary perspective is that of the entrepreneur and the techniques and skills employed in managing growing enterprises. Presentations by venture capitalists and entrepreneurs supplement student discussion and analysis of cases. Grades are based on written reports, quality of classroom participation, and a final exam.

NBA 5590 The Venture Capital Industry and Private Equity Markets

Spring, 0.5 credit. D. BenDaniel.

Four lectures (two on Friday afternoon, two on Saturday morning) will be given by Jesse Reyes, former vice president of research for Thompson's venture capital data subsidiary. The lectures will focus on the venture capital and private equity industries from the practitioners' perspective. Topics include (1) an introduction to the private equity market focusing on the transactions that define the industry, its structure, participants, history, and trends; (2) institutional private equity investing—now an increasingly important and dynamic part of the asset allocation mix; (3) issues in private equity investing such as concentration in fewer, larger funds; and (4) the critical role of a new class of gatekeeper/consultants for limited partners. There will be a final paper.

NBA 5630 The IPO and Mergers and Acquisition Process

Fall, 3 credits. T. Willett.

Gives students an in-depth look at initial public offerings and deal structures from a practitioner's point of view. With respect to initial public offerings, the course covers the applicable statutory framework, pre-offering corporate preparations, the due diligence process, the implementation of corporate governance policies appropriate for a public company, the offering registration process, liability under federal securities laws, the Securities and Exchange Commission review process, underwriting arrangements, and selection of a trading forum. Regarding deal structures, the course explores choosing an appropriate transaction structure, deal financing alternatives, due diligence, public company transaction issues, and crucial legal aspects of the acquisition, such as caps/collars, letters of intent, successor liability, continuity of employees, and noncompetition agreements.

NBA 5640 Entrepreneurship and Private Equity

Fall, spring, 3 credits. D. BenDaniel and S. Gaul.

This course uses lectures and live case studies to address entrepreneurial management in start-up ventures and private equity investments. Topics include valuation and growth management of start-up ventures, buying and selling businesses, leveraged buyouts, and business plans produced by student teams. Guest lecturers speak on specialized topics such as boards of start-up companies, distressed businesses, real estate investment, and entrepreneurial marketing. The lectures and cases are in the first half of the semester and the business plans are developed in the second half. The course attempts to integrate marketing, finance,

operations, and human-resource topics in the context of high-growth business ventures and business ventures and private equity.

NBA 6180 Global Innovation and Technology Commercialization

Spring, 1.5 credits. W. Sine.

Examines technology commercialization from an investor's point of view. Will address issues related to intellectual property, recognizing and screening opportunities, exploiting technology opportunities, and marketing high technology. Case studies and discussions with practitioners will be used to examine this topic.

NBA 6530 Strategic Alliances

Spring, 1 credit. J. Suwinski.

A wide variety of strategic alliances are being used today as companies try to leverage their resources for competitive advantage. This course gives an overview of the spectrum of alliances, examining the strategic rationale and pros and cons of each major type of alliance. The primary focus is on joint ventures as a specific form of strategic alliance, where the success rate is less than 50 percent. The course develops a set of principles that have contributed to success for Corning Incorporated. The course is taught from the perspective of the general manager of a major business unit.

NBA 6780 Advance Private Equity; Negotiations and Structuring

Spring, 1.5 credits. Prerequisites: NBA 5640, NBA 3000, or permission of instructor. Staff.

Focuses on venture capital financing, including the problems and issues facing emerging growth companies as they progress from early stage, start-up status to mature public companies. Emphasizes practical skills: hands-on examination, for example, of how deals are negotiated and valuations arrived at, the principal focus being the so-called Series A, or first professional, round of financing. Views the early stage space from three perspectives: (1) the entrepreneur, or founder, (2) the professional investors, or VCs, and (3) the key executives, i.e., the major players in emerging growth finance. Reviews economics, finance, tax, securities, corporate and employment law considerations, and custom and usage in the industry.

NBA 6890 Law for High-Growth Business

Fall, 3 credits. Z. Shulman.

In-depth analysis of key issues that an emerging high-growth business must consider and address, including (1) choosing type of business entity, (2) protecting confidential information and inventions, (3) sources of capital, (4) understanding capitalization structures (e.g., common stock, preferred stock, preferred stock terms and economics), (5) using stock options as employee incentives, (6) fundamental fair employment practices, (7) proper establishment and use of boards of directors and advisory boards, (8) structuring convertible debt for start-ups, (9) bribery and the Foreign Corrupt Practices Act, and (10) dealing with lawyers.

Finance

NBA 5120 Applied Portfolio Management

Fall, spring. 3 credits each semester. Limited enrollment. Students must commit to taking course in fall and spring semesters. Priority given to second-year M.B.A.s who successfully completed either NBA 5060 or finance immersion. Students must apply formally; if number of applicants exceeds 12, admission is competitive and merit-based. S. Bhojraj.

Focuses on the management of an investment fund. For full description, see Sanjeev Bhojraj.

NBA 5130 International Finance Cases

Spring. 1.5 credits. W. Bailey.

International finance is different because of two issues, exchange rate volatility and barriers to the flow of capital. Furthermore, political risk is heightened when money crosses borders, and governance, disclosure, law, and regulation are more varied than in a single-country context. The purpose of this course is to practice applying the ideas and methods of finance to cross-border problems. The course is centered on six cases including discussions of related research and other materials.

[NBA 5210 Advanced Valuation: Mergers, Acquisitions, and Chapter Restructuring]

NBA 5400 Advanced Corporate Finance

Fall. 3 credits. Prerequisite: NBA 5060 or equivalent. Staff.

Relevant for both investment banking and the treasurer's activities of an operating corporation. Most class sessions are lecture-discussion, but there will be several corporate finance cases. Topics include debt securities (duration, convexity, inverse floaters, bond refunding, term structure), convertible debt, capital structure, distribution policy, exotic new securities, financial strategies, and the buy versus lease decision. Investigates corporate financial policy decisions from a normative-quantitative point of view and develops skill in formulating financial models and evaluating models. Uses basic mathematics.

NBA 5405 Advanced Corporate Finance

Spring. 1.5 credits. H. Bierman.

This course is relevant for banking, investment banking, security analysis, and the financial activities of an operation corporation. Class sessions are lecture-discussion and a very few cases. We will investigate corporate financial policy decisions from a normative-quantitative point of view and develop some skill in formulating financial models, and in evaluating financial models. The mathematics used is basic algebra. We want to develop an approach to the analysis of financing decisions of corporations. The time spent on each topic will depend on how long each topic takes. There will be several class leaders from the real world talking to the class, as well as visitors.

NBA 5420 Investment and Portfolio Management

Spring. 3 credits. Prerequisite: NCC 5060, NCC 5560, or an equivalent core finance course. G. Saar.

This course emphasizes both conceptual foundations and practical implementation. The material in the course would be helpful to anyone interested in investing. However, the course should be especially useful to students

interested in an investment management career (e.g., portfolio management in mutual funds and hedge funds, equity research, equity trading, risk management, investment consulting, and investment banking). After a brief review of fundamental issues (such as the risk/return trade-off), the course contains an extensive module on strategic asset allocation with a focus on practical implementation. The course continues with an exposition of certain approaches to tactical asset allocation. The remainder of the course focuses on topics relevant to security selection and optimal portfolio construction. The course contains an extensive discussion of equity multifactor models and screening, with applications to value and growth investing. The course highlights trends in the investment management industry and introduces terminology and tools familiar to investment professionals.

NBA 5430 Financial Markets and Institutions

Fall, spring. 3 credits. Prerequisite: NCC 5060. W. Bailey.

Applies principles of finance to understand modern financial markets. Central themes are the structure of financial markets, their pricing function, the interaction between financial markets and macroeconomic conditions, and the processes of innovation and regulation in these markets. Students look at the workings of a variety of markets and develop an understanding of the different problems that different types of markets address. Studies the question of market efficiency and the interaction between government policies and financial markets. Analyzes issues in innovation and regulation with basic principles of financial economics. Throughout the course, the relevance of these issues for the practical corporate, portfolio, or public sector decision maker is considered. The course includes ideas and evidence from academic research along with historical, institutional, and international perspectives. Recent events are used to illustrate concepts and develop analytic skills. Spreadsheet assignments and a term project requiring data analysis develop research skills and illustrate academic concepts. Exams consist of computational, short answer, and short essay questions.

NBA 5450 The Search for Alpha

Fall. 1 credit. R. Marin.

This course will focus on the fundamental trends under way in the asset management industry. While it will start with an overview of the investment management industry, it will move quickly toward a review of the more recent growth in hedge funds. Given the attention that the investment management industry (not to mention the world at large) has put on hedge funds and the relatively unregulated and secretive nature of the breed, the course will seek to answer the question of what exactly is going on in the industry and where it is going. The intention will be to give students an overview of the hedge fund space from the perspective of what comprises it, who the participants are (managers, investors, support areas, and intermediaries), how hedge funds are assessed and measured both individually and in portfolio, how investors access hedge funds, and what major issues face the industry.

NBA 5460 Liability Driven Alpha

Spring. 1 credit. R. Marin.

This course will focus on the fundamental trends underway in the pension management industry. This \$3 trillion arena has, from before the creation of ERISA to the present day, been managed in a very homogenous manner with similar investment approaches and very questionable results. The convergence of accounting, regulatory, and market forces is forcing change upon the industry in a way that will impact a broad range of service providers and potential investors, and indeed the underlying company plan sponsors and the very participants they serve. These changes will produce major dislocations and opportunities for asset managers, investment bankers, insurance companies, private equity firms, hedge funds and a whole array of processing companies. Given the demographics of the aging baby boomer population and the looming crisis in global retirement funding, this may prove to be a bellwether issue in finance and social policy for the next decade. The changing regulatory and accounting rules that govern defined benefit plans will be reviewed with emphasis on the Pension Protection Act of 2006, FAS 158 (Phases I and II) and the convergence of U.S. and international accounting standards in this arena.

NBA 5470 Operational Alpha

Spring. 1 credit. R. Marin.

This course will focus on the elements of the asset management industry that most critically add to success, but that are outside the traditional realm of investment strategy. It is generally understood today that risk is comprised of many elements and includes a significant component of operational risk. There are operational elements of the investment process that clearly add or detract significant value from returns just like operational risk can add to or detract from overall risk. These operational elements that add to return can be called operational alpha and the more mature a market or investment strategy becomes, or the more difficult the return environment, the more important operational alpha becomes.

NBA 5520 Cases in Corporate Finance

Fall. 3 credits. Prerequisites: second-year M.B.A.s and Accelerated M.B.A. (AMBA) students; NCC 5060 or equivalent.

H. Bierman.

We will develop an understanding of the theories of corporate finance and have discussions of corporate finance cases. Cases and lectures deal with mergers, acquisitions, valuation, corporate restructuring, LBOs, MBOs, distribution policies, and the financing of corporations. The material applies to careers in investment banking, managerial finance, and top-level executives. Several executives working in or with corporate finance will present cases. The goal is to develop a skill in analyzing the financing decisions of corporations.

NBA 5540 International Finance

Spring. 3 credits. Prerequisite: NCC 5060 or permission of instructor. W. Bailey.

Applies principles of finance to the international setting. International finance is different in two basic respects: (1) the existence of multiple currencies adds risk to investment and financing decisions; (2) when corporations and portfolio investors cross international borders, both problems and opportunities arise. This course focuses on these issues and highlights how finance theory

can be extended to address them. Students apply the basic principles of international finance to a variety of problems. The course helps students understand the ideas and research results of international finance and adapt what they learn to the practical problems in the increasingly globalized business world. The first part of the course outlines exchange rate volatility, barriers to international capital flows, and the value of international diversification. The second part presents a variety of problems, examples, and applications from the three basic themes described in part one. Spreadsheet assignments and a term project requiring data analysis develop research skills and illustrate academic concepts. Exams consist of computational, short answer, and short essay questions.

NBA 5550 Fixed-Income Securities and Interest Rate Options

Fall. 3 credits. Prerequisites: NCC 5060, NCC 5010. R. Jarro.

Designed to study the pricing, hedging, and risk management of fixed-income securities and interest rate derivatives. Topics include the term structure of interest rates, interest rate swaps (caps, floors, collars), the risk structure of interest rates, credit risk spreads, and corporate bond valuation. The method of instruction is lectures and discussion, and computer illustrations are an integral part of the course content.

NBA 5580 Corporate Financial Policy

Fall, spring. 1.5 credits. Prerequisite: NCC 5060. Y. Grinstein and M. Leary.

Provides an understanding of the financial decisions of corporations. Discusses the factors that affect corporate financial decisions and how they determine firms' financing, investment, and hedging policies. These factors include taxes, transaction costs, contracting (between managers and shareholders and between shareholders and other claimholders such as bondholders), and asymmetric information. Much of the material is presented using examples and cases designed to demonstrate how financial decisions create, destroy, or modify value.

NBA 5650 Corporate Governance

Spring. 1.5 credits. Prerequisites: NCC 5060 and NBA 6560 or permission of instructor. Y. Grinstein and R. Swieringa.

Deals with the ways in which different investors assure themselves of getting a return on their investments. How do investors get managers to return some of the profits to them? How do they make sure that managers do not invest their money in bad projects? These questions are extremely relevant for almost any organization, from start-ups to Forbes 500 companies. This course explores these issues through a series of case studies and examples. Topics depend on time availability. Career focus: M.B.A. students aspiring to top corporate offices, regardless of functional area, or envisioning a career in M&A/investment banking, financial management, or consulting firms.

NBA 5850 Advanced Topics in Valuation

Fall. credits TBD. Prerequisite: NBA 6560 or equivalent. W. Rehm.

NBA 5850 is an entirely case-base class that builds on the core valuation class. Students will apply the principles of corporate valuation (DCF, APV, and multiples) to several real-life companies in different industries. We will address how to adjust "normal" valuation

method—what to do when the standard approach gives strange results. The goal is to prepare students for "real life" valuations of complex, multibusiness-unit companies. Teams of four students will prepare a case for each class. We will spend about one-third of each class on the prepared case, one-third on key technical issues, and one-third on an introduction to the next industry.

NBA 5980 Behavioral Finance

Spring. 3 credits. M. Huang.

Traditional finance theories assume that financial market participants are rational, and argue that the financial market is always efficient. Behavioral finance, on the other hand, argues that some financial market phenomena can plausibly be understood only under the assumption that some market participants are not fully rational. This course gives an introduction to behavioral finance. Introduced to the conceptual framework of behavioral finance, and then apply the framework to study a wide range of issues in asset pricing, investment, and corporate finance. Topics covered in the course include investor psychology and behavior, limits of arbitrage, aggregate market timing, anomalies in stock portfolio returns (including value, momentum, size, and many other effects), professional money management, corporate issuance, mergers and acquisitions, investment banking, and earnings management. As a summary of the course, we will apply the conceptual framework of behavioral finance to understanding China's financial market.

[NBA 6550 Advanced Valuations]

NBA 6560 Valuations Principles

Fall, spring. 1.5 credits. D. Weinbaum.

Deals with the principles of valuation for publicly traded firms, divisions of publicly traded firms, or private firms that have publicly traded comparables, using discounted cash flow (DCF) valuation. The definitions of cash flow and discount rate depend on whether we want to value the entire firm or value only equity. Discusses (1) how to compute free cash flows based on historical income statements and balance sheets; (2) the concept of value drivers and economic value added (economic profits or residual income); (3) operating risk and financial risk, the relation between financial leverage and cost of capital, the levering and unlevering of equity betas, capital asset pricing model, computing cost of equity, cost of debt, cost of preferred stock, weighted average cost of capital, divisional cost of capital, etc. These concepts are applied; (4) to computing cost of capital. Introduces valuation by multiples using comparables and discusses its applications to valuing divisions of multibusiness firms.

NBA 6730 Introduction to Derivatives, Part 1

Fall, spring. 1.5 credits. Prerequisite: NCC 5060 or permission of instructor. X. Zhang.

Introduces students to the pricing and hedging of derivative securities. Briefly covers forward contracts, futures contracts, and swaps. The primary emphasis is on option contracts. Underlying assets include stocks, currencies, and commodities.

NBA 6740 Introduction to Derivatives, Part 2

Fall. 1.5 credits. Prerequisite: NCC 5060 or permission of instructor. X. Zhang. For description, see NBA 6730.

NBA 6940 Equity Derivatives and Related Products

Fall. 3 credits. M. Zurack.

Relying on quantitative techniques and practical experiences, this course attempts to provide an in-depth analysis of how equity derivatives and related products are structured, valued, and used by all types of investors globally. Students attending this class will learn many real-world applications of these products, which they should find useful in equity sales and trading, private wealth management, investment management, as well as Investment Banking pursuits. The course is broken into the following sections: Exchange Traded Funds, Futures Portfolio Trading and Swaps; Equity and Credit Options and Convertibles; Strategies; Non-U.S. Markets.

General Management

NBA 5140 Ethics and Corporate Culture

Spring. 1.5 credits. D. Radcliffe and B. Wendel.

In the high-pressure worlds of business and law, all too often good people do bad things. In many cases, the unethical behavior is due in part to a "toxic" corporate culture. The attitudes, values, and practices that prevail in their organizations induce otherwise ethical employees to take actions that violate widely shared norms of conduct. Such behavior can be costly—even disastrous—leading to ruined careers, tarnished corporate reputations, and legal liability for the individuals and their companies. In an environment where "only results matter," it can be difficult for a new M.B.A. or law school graduate to recognize the risks. If she does see the dangers, she may still find it hard to avoid them. This course seeks, first, to help M.B.A. and law students understand how a firm's culture can tempt—or push—employees into unethical behavior. Second, the course aims to acquaint students with strategies for dealing with ethical challenges posed by a problematic corporate culture. Class sessions include discussion of case studies and articles reporting on relevant research in organizational behavior, as well as talks by noted guest speakers from the fields of business and law. Since managers and attorneys frequently work together, team projects require collaboration among M.B.A.s and law students, as they bring both business and legal perspectives to bear on tough ethical issues. Course grades are based on class participation and several short writing assignments (individual and group).

NBA 5250 Energy and the Environment: An Economics Approach

Spring. 3 credits. Prerequisite: NCC 5020. B. Ho.

Energy use and its impact on the environment will be two of the most important issues of the 21st century. The large role of energy in geopolitical relationships combined with the fact that most of the greenhouse gas emissions associated with global climate change come from energy production, means the energy sector is poised for dramatic change, and thus great opportunity. This course is designed to be a primer for potential entrepreneurs, investors, managers and policy makers on energy and environmental issues. We will consider the economic, social, political, and strategic realities of the energy sector using political/economic analysis, and strategic case analysis. Topics will include environmental economics, energy economics, environmental

ethics, the politics of energy, NGO activism, climate change, the oil sector, the electricity sector, alternative energy, the international context, and sustainability.

NBA 5330 Management Cases and Consulting Process

Spring, 3 credits. N. Peck.

The objective of the course is to prepare first-year students for summer internships and careers in consulting and general management by developing their analytic skills and understanding of project-oriented business problems. Students will be expected to answer case questions and present solutions in class. In addition, a semester-long case study of a consulting project will be conducted with teams providing proposal, interim, and final presentations.

NBA 5600 Business Law I (also AEM 3200)

Fall, 3 credits. Requirement for students intending to be professional accountants. Highly recommended for finance students. Prerequisite: junior, senior, or graduate standing. D. Grossman.

Introduces the basic tenets of law as they apply to businesses and their operations. Topics include personal property, contracts, agency, and real property. Uses text readings and case studies.

NBA 5610 Business Law II (also AEM 3210)

Spring, 3 credits. Prerequisite: NBA 5600 or permission of instructor. D. Grossman.

The first portion of this course examines legal issues in the formation and operation of business enterprises, particularly partnerships, corporations, and limited-liability companies. The second portion covers selected topics in business law, such as employment discrimination, secured transactions, product liability, unfair competition, and international business law.

NBA 5620 Estate Planning (also AEM 4220)

Fall, 14 sessions. 1 credit. Prerequisite: junior, senior, or graduate standing. D. Grossman.

Covers law and use of trusts, the law of wills, federal and New York State estate and gift taxes, and probate procedures.

NBA 5670 Management Writing

Fall, spring, 1.5 credits. Priority given to M.B.A. students; open to other graduate students and employee degree candidates if room. B. Mink, C. Rosen, and A. Noble-Grange.

Students learn to write clearly and effectively by focusing on the writing process as well as the finished product. Topics include audience perspective, style, organization, strategy, and persuasion. There is a writing assignment every week. Students receive instructor and peer feedback.

NBA 5680 Oral Communication

Fall, spring, seven weeks. 1.5 credits. Priority given to M.B.A. students; open to other graduate students and employee degree candidates if room. B. Mink, C. Rosen, and A. Noble-Grange.

Focuses on improving the presentation skills of management students. Covers speaking formats, delivery, organization, visual aids, persuasion, and question/answer. Student speeches constitute the bulk of class time, with each student presenting seven or eight

speeches, many of which are video recorded. The small class size allows for significant individual attention and feedback from peers and the instructor.

[NBA 5690 Management Consulting]

NBA 5700 Foundations of Leadership

Spring, 1.5 credits. P. Stepp.

The purpose of the course is to assess the leadership and management skills of students by providing an opportunity to gather feedback on their strengths and developmental needs. The first two days focus on self-awareness and employs several experiential exercises and self-assessment instruments, including: Johnson Leadership 360 Assessment, the Myers-Briggs Type Indicator (MBTI), and the Fundamental Interpersonal Relations Orientation-Behavior (FIRO-B). Class members will be trained in giving and receiving feedback from team members. Activities will include various leadership and team challenges. Professional feedback providers will observe students in group work and provide feedback on their observations and the results of the individual instruments. The final day of the course, students will focus on goal setting for future leadership development.

NBA 5710 Cornell Management Simulation

Fall, 1.5 credits. Prerequisite: second-year M.B.A. students. Not open to students who have completed NBA 5490. S. Smidt.

This computer-based simulation is played by self-selected teams of three or four students who make marketing, production, and finance decisions for one of five companies operating competitively in the same industry. After the first week, during which the rules of the simulation are explained and the software used by each team is demonstrated, the teams make periodic decisions (meeting at their own convenience). At the beginning of the simulation, each team writes a strategic intent paper and, before the results of the last decision have been determined, presents an in-depth analysis of its performance and its strategy for the future in a "board of directors" (BOD) meeting. Grades are based on the value created for the company's shareholders (relative to other firms in the same industry), the team's strategic intent paper, and the instructor's evaluation of team's performance at the BOD meeting. Meetings are periodic throughout the semester.

NBA 5730 Seminar in Sustainable Development

Spring, 1-3 credits, variable. A. McAdams.

Involves readings and discussion of issues in environmental management and features four significant outside speakers on the subject of environmental management. (Students interested in doing consulting projects in environmental management are accommodated in NBA 5750 Management Projects.)

NBA 5740 Management Practicum for AMBA Students

Fall 3 credits. Prerequisite: accelerated M.B.A. (AMBA). R. Allen.

This course would begin in the summer with a relationship meeting with the companies involved as clients. The clients would be recruited between now and then to focus on companies with technology/science content consistent with the background of many of the TMO students. The types of companies we would focus on are ones that are research centric and ideally within driving distance or

closely aligned with the school. The companies need to be willing to commit their resources and support and will provide a two-week internship.

NBA 5750 Management Consulting Projects

Spring, 3 credits. G. Hubbell.

This is a full-semester course designed to apply consulting processes to real business projects. Students will be formed into consulting teams focused on specific strategic, process improvement or operational problems in companies. Consultant in Residence, Greg Hubbell, will teach the course supported by Consultant Advisor, Rich Schneider. The teams will meet together with the faculty advisors on a weekly basis. Sessions will focus on cross-team learning about the application of the consulting process into a variety of consulting engagements. The Consultant Advisor and CIR will also meet as needed with each individual team to work through real-time issues presented by each consulting project. Consulting projects are intended to include local business clients, not-for-profits, as well as large national and multinational companies. At the end of the project, each student and team will receive 360 feedback from the Consultant Advisor, CIR, the client, and other team members.

NBA 5770 The Political, Legal, and Social Environment of Business

Spring, 3 credits. B. Ho.

The course addresses the managerial issues in the political, legal, and social environment of business. Most strategy courses focus on interactions with customers, competitors, suppliers, workers, or financial institutions that occur in market contexts. However, many strategic interactions occur outside of the marketplace. Drawing from research in political economy, this course focuses on integrated strategy in nonmarket environments, i.e., strategy that involves nonmarket constituents and institutions such as governments, non-government organizations (NGOs) and intergovernmental organizations. Topics include: activists, the media, lobbying, the U.S. political system, environmental and other regulation, antitrust, intellectual property, international political economy, trade policy, ethics, and corporate social responsibility.

NBA 5780 Consulting Process

Fall, spring, 1.5 credits. N. Peck.

Focuses on understanding and applying the basic consulting process by covering the elements of a consulting engagement, including selling the engagement, scoping the project, contracting with the client, forming the consulting team, creating consultant/client work teams, defining deliverables, developing a work plan, conducting analysis, creating a communication and change plan, managing the project, overcoming resistance and barriers, developing recommendations, presenting the deliverables/implementation plan, and developing potential follow-on work. The course is organized around a real client engagement, examining the consulting process from the perspective of the case. Several guest speakers from the consulting engagement add both client and consulting perspectives. The course is intended for students with no or limited consulting experience who have an interest in exploring consulting as a career or who want to sharpen their analytical and organizational change skills.

NBA 5790 Cases in Business Strategy

Fall. 1.5 credits. Prerequisite: second-year M.B.A. students. J. Suwinski.

Focuses on the process of effective strategy formulation from the perspective of the general manager of a business unit. Discusses corporate strategy and its interaction with business unit strategies; tools for industry and company analysis; and situational analysis. Complements the core strategy course, with emphasis on understanding and practicing frameworks that are useful in case-based interviews. Draws heavily on the instructor's experience developing strategy for numerous businesses at Corning Incorporated. Guest speakers from industry and strategy consulting firms and from industry present their approaches to strategy and discuss the analytical tools they find most effective in working on business strategy. Students gain experience, via assigned cases, in analyzing business problems/opportunities, using the strategic process to formulate effective business strategies, and in presenting their recommendations in written and oral form. A major case write-up and presentation in a mock board environment at the end of the course gives each student an opportunity to play the role of a strategy consultant working on a real case.

NBA 5810 Management Cases

Fall. 1.5 credits. N. Peck.

This half-semester course will focus on analyzing multidisciplinary business cases from a CEO perspective. The course will develop students' analytical and strategic thinking and their presentation skills for effective communication as executive managers or consultants to executive managers. Students will be expected to answer case questions and present solutions in class.

NBA 6030 Sustainable Global Enterprise

Spring. 1.5 credits. Staff.

Explores the connections between "global sustainability" and business strategy—the unlimited business opportunities in solving the world's most difficult problems. Through a combination of cases, readings, lectures, videos, and simulations, class sessions will engage students in discussions aimed at developing strategy models and applying new strategy tools that incorporate principles of environmental management and social performance.

NBA 6110 Creative Design for Affordability

Spring. 1.5 credits. A. McAdams.

The idea of Creative Design for Affordability is to use product design to help students become more aware of their own creativity and to give them the background necessary to lead or facilitate creative teams in their future careers as managers. Most important, students will be required to actively participate in their teams' creative processes and engage in designing, building, and iterating working prototypes of simple products. Another objective of the course is to give students the tools to understand the product design process as it typically occurs within some of today's organizations. Students will become well versed in real case studies from companies like Kodak and IDEO, and they will come to understand the basics of how to design products that at once appeal to the target customer, meet the customer's needs, and meet the highest quality specifications,

while achieving a level of sustainability through the use of reusable or eco-friendly materials. While achieving all of these goals, students must—above all—design products that are affordable to the consumer.

NBA 6690 Leading Teams

Spring. 1.5 credits. M. Thomas-Hunt.

This course examines the design, management, and leadership of teams in organizational settings. The focus is on the interpersonal processes and structural characteristics that influence the effectiveness of teams, individual behavior in face-to-face interactions, and the dynamics of interpersonal relationships. The purpose of this course is to understand the theory and processes of group and team behavior so that leaders can successfully work with teams. Students who take advantage of everything this course has to offer will become comfortable and adept in leading group and team enterprises. The primary teaching method in this course will be inductive and experiential. Relatively little class time will be devoted to standard lectures. Much of the learning that occurs in the course will involve exercises and simulations that draw on students' current experiences in the class as well as their previous experiences in teams and organizations outside of Cornell.

NBA 6720 Goal Setting for Personal Leadership

Fall. 1.5 credits. Prerequisite: NBA 5700. P. Stepp.

This course is required for the Leadership Focus Program designed as a follow-up to NBA 5700 and will introduce students to "leader as coach." The lasting value of NBA 5700 Foundations of Leadership depends on the amount of follow through students achieve on their personal learning plans (MAPS), learn how to learn about personal behavior change on their own, and learn to coach others. The action learning method will be used to link leadership development to immediate business and personal concerns by challenging participants to practice leadership skills in real world activities. The course will provide structured support for personal change using MAPS plans, establishing learning and development strategies, and receiving feedback and coaching support from peers and practitioners. Students will leave the course with a mission and values statement to help guide and drive personal learning plans, and align them with career aspirations.

NBA 6770 Systems Tools for Sustainable Enterprise, Concepts, Methods, and Applications

Spring. 1.5 credits. Prerequisite: Master students. J. Geurts.

Using readings and cases, this course on strategy making for sustainability introduces the students to modern hybrid interactive processes such as 'systems dynamics group modeling', 'scenario building', 'strategic decision analysis', 'interactive strategic journey designs', and gaming/simulation. Students will get to know and apply the tools mentioned above that can be woven together to form systemic and interactive managerial support processes using both systems analytical and collective learning techniques to assist an organization in policy exploration, decision making, and strategic change for sustainability.

NBA 6900 Sustainable Global Enterprise in Hospitality (also HADM 6690)

Spring. 4 credits. M. Milstein.

An advanced experiential learning course in which students are primarily tasked to work directly with hospitality companies to solve real sustainability-related issues in the marketplace. Projects relate to the greening of current operations (operational), the refurbishment of existing assets and properties (brownfield), and the establishment of new businesses (greenfield). The goal of the course is to provide students with the opportunity to develop and refine critical analysis and decision-making skills related to hospitality management and sustainability through hands-on learning experiences.

NBA 6950 Game Theory and Business Strategy

Spring. 1.5 credits. H. Schneider.

Game theory provides a method for identifying optimal strategies and predicting the outcomes of strategic interactions when players' actions impinge upon each other. Using lectures and in-class games, this course develops the basic tools of game theory as they relate to business situation, and then applies them to business examples and cases. Some of the topics covered include strategic cooperation and punishment between firms, strategic commitments, predatory and limit pricing, entry deterrence, and auctions. The final deliverable is a take-home essay in which you apply the course material to a game theoretic setting of your choice. This course requires only basic mathematics skills, but a familiarity with strategic concepts is recommended.

International Management**NBA 5240 Macroeconomics and International Trade**

Spring. 3 credits. I. Azis.

Applies basic macroeconomic theory to such problems as inflation, unemployment, economic growth, and productivity and examines how those problems interact with international trade and finance. Students learn to be informed observers of national and international economic policies and discerning users of economic analyses and forecasts.

NBA 5480 Global Business Risk Management

Spring. 1.5 credits. E. Iankova.

The aim of this course is to introduce students to the global risks involved in international business operations, and to develop students' general understanding of the field of global risk analysis and management. More specifically, students will get acquainted with the various types of risks that international businesses face in their overseas operations, such as: political risks (asset expropriation, contract repudiation, legal and regulatory risks), macroeconomic risks (taxation risk), market risks (intellectual property theft), financial risks, operational risks (reputation and public image issues), societal risks (activism of international nongovernmental organizations), and everyday risks (corruption). Through a combination of readings, lectures, guest speakers and case discussions students will develop practical skills in evaluating and assessing risk, and will learn how to approach and manage risks on a global scale.

NBA 5800 Strategies for Global Competitiveness

Fall. 3 credits. Can be used to fulfill strategy requirement. A. McAdams.

Initially, students explore the role of government in several private-market industrialized nations—Japan, France, Germany, the United Kingdom, and Italy—for lessons the United States might learn and use. Students investigate the impact in each of those countries of government policies on the global competitiveness of the country's firms. Special emphasis is given to differential policies appropriate to each of a range of industries, from the mature to the high tech (including computers, telecommunications, and electronics), and to stages of development in each economy. Possible lessons are then tested for less developed countries that might include Venezuela and Malaysia and newly emergent countries such as Singapore. Classes are run in a discussion format.

NBA 5840 International Competitive Strategy

Spring, 1.5 credits. G. Katzenstein.

Focuses on the development of competitive strategies in the global environment—including the identification of internationally relevant strengths and weaknesses, the movement and use of resources to gain competitive advantage, and strategies to confront competitors, both domestic and multinational.

NBA 5870 International Mergers and Acquisitions

Spring, 1.5–2 credits, variable. J. Hanks.

Addresses the principal business and legal issues in cross-border mergers and acquisitions, including forms and techniques of combining two businesses, negotiation, pricing and other economic terms, due diligence, issuance of securities, antitrust, duties of managers, and the resolution of employee and other social issues. The graded work is a written proposal for an M&A transaction between two existing companies in different countries prepared by small teams. Proposals are based on publicly available financial, business, legal, and other documents and data and any other information obtained. The goal of the written work is to simulate the process in which business people, investment bankers, and lawyers work together to structure transactions across national borders. The reading covers the basic business and legal issues most frequently encountered in international mergers and acquisitions. Class discussion occasionally refers to the reading but generally covers other issues.

NBA 5890 International Management

Spring, 3 credits. G. Katzenstein.

International management is a survey of international business from a cultural and managerial perspective. The course uses culture as a foundation to examine a variety of considerations related to business in an international context. The first part of the course briefly examines the context and environment of cross-cultural management. We will look at globalization, why firms get involved in international business, and how they analyze their investment environment and opportunities. The second part of the course concerns analyzing international business, including macro issues such as organizational structure, control, and culture, and micro concerns such as motivation, leadership, negotiation, teams, decision making, and human resource management.

NBA 5900 Business in Emerging Markets

Fall 1.5 credits. E. Iankova.

This course focuses on the opportunities and market potential, as well as the risk factors in emerging economies. It offers an in-depth comparative perspective on business development and strategy across the most important regions with emerging markets in the world—Eastern Europe, Asia, and Latin America, with a special emphasis on the BRIC countries (Brazil, Russia, India, and China). The course looks at the emerging economies from four major perspectives: market potential; trading opportunities; sourcing; and global competition. It examines in greater detail foreign investment trends, entry strategies and investment decisions, determinants of enterprise behavior, modes of establishing and managing relationships, impact of local cultures, and strategic responses to potential risks and opportunities in emerging markets.

NBA 5920 Experience in International Management

Fall, spring, 1.5 credits. Fee charged for required faculty-approved study trip.

G. Katzenstein.

Combines classroom sessions and international experience with an increased awareness of business environments outside the United States. On trips, students visit local businesses, subsidiaries of foreign multinationals, government officials, local business school students, and others. Students also must attend two pre-trip meetings during spring semester (2-1/2 hours each). Those meetings are used to present information on international business conditions, industrial structures, management styles, and also to develop cross-cultural skills. A final paper, integrating the material learned in the classroom with their experiences, is required.

NBA 5930 International Entrepreneurship

Spring, 1.5 credits. Prerequisite: At least one finance or economics class.

M. Goldman.

Entrepreneurial start-ups and their financing across the globe (outside of the United States) are the focus of the course. Sessions will examine the constraints to entrepreneurs and the ways in which they obtain financing with a particular focus on venture capital and emerging markets. The course will use cases of successful entrepreneurs under the most difficult circumstances and will address entrepreneurship in a serious downturn and networking across borders. In addition to common issues related to starting a business and investing in it, the class will address issues not normally on the radar screen of U.S. entrepreneurs and venture capitalists. The course will draw on the experience of investors and entrepreneurs, cases prepared especially for this course, as well as findings reported in the research literature. This course is meant to be in part a practical guide to students who wish to be entrepreneurs outside the United States or to create cross border businesses. It may be of interest to people working in entrepreneurial environments in other organizations or students who want to get involved in various forms of financing entrepreneurial ventures. Students may use the course to explore development of a business concept or plan outside (at least in part) the United States. There will be a particular concentration on Asia, the role of government in stimulating entrepreneurship and venture capital and the nitty-gritty issues of valuing young and private

firms sharing profits, raising resources, and organizing and managing human resources.

NBA 5940 Asian Business

Spring, 1.5 credits. G. Katzenstein.

This course takes a managerial perspective to introduce students to those differences, whether working in Asia or managing operations and personnel in Asia. The course will cover major issues in strategy, organizational behavior, and human resource management in the Asian context. The strategy part of the course will look at issues including particular Asian forms of organization and larger strategic issues such as the role of government, corruption, intellectual property, and the Asian Diaspora. The organizational behavior part of the class will look at issues such as national culture, communication, leadership, motivation, decision making, and group dynamics in an Asian context. The human resource part of the course will examine recruiting, developing, and retaining your local personnel, managing expatriates in Asia, and localization of Asian businesses.

NBA 5950 Economics of Financial Crises

Spring, 3 credits. I. Azis.

Familiarizes students with the analysis of the causes, nature, and consequences of financial crises, and equips them with tools of analyses to better understand the economics of financial instability and alternative strategies for dealing with them. The first part of the course concentrates on financial instability/crisis by way of explaining the empirical episodes of the crisis in various emerging market countries, and elucidating the relevant theoretical concepts in each of the cases. The second part is devoted to discussions of post-crisis episodes, emphasizing the different paths of recovery and major policy responses to the crisis. The latter includes financial and monetary policies and the unsettled relationship between interest rates and exchange rates.

NBA 5990 Business in the European Union

Fall, 1.5 credits. E. Iankova.

Explores the impact of the process of European integration on business organization and strategy. The foundations, institutions, and common policies of the European Union are discussed first. The course further examines how the establishment of the Economic and Monetary Union and the 2004 enlargement to the east are shaping the strategies of multinational corporations with operations in Europe. To understand better the pressures for change in a "deepening" and "widening" European Union in their complexity and entirety, students become personally involved in problem solving through issue and case discussions, such as determinants and policy of entrepreneurship in a European–U.S. comparison; corporate networks in a European–U.S. comparison; trade policy and the European Union's trade disputes with the United States; competition policy and Microsoft's antitrust battles in European courts; environmental policies and corporate sustainability issues in Europe; the common agricultural policy of the European Union and the impact of global trade talks on European farm subsidies; work conditions in Europe and the Wal-Mart experience with doing retail business in Europe; and a variety of other mini-cases.

NBA 6250 International Marketing

Fall. 1.5 credits. Recommended: background in core marketing. Staff. Designed to train students to take a domestic product and successfully expand it into international markets. Discusses market selection, international market research issues, and international marketing strategies. The term project (submitted in three parts throughout the semester) requires students to choose a product and develop a plan for taking it abroad. Because each class includes cases, class preparation is essential. Grading is based on the term project, a final exam, and class participation.

NBA 6310 The Global Enterprise

Fall. 2 credits. G. Dowell. Whether you are working in a large multinational or a business that is focused on the domestic market, global forces are affecting your organization. This course is designed to give you a strong grounding in the basic issues affecting global business today, from macro forces like economic and political risk, to internal organizational issues like assessing your business's preparedness for global business. We bring these issues to life by taking a trip to work with students from a foreign business school and to visit companies in that environment—for the last two years the trip has been to Shanghai, China, and it most likely will involve China again this year.

Strategic Technology Management**NBA 5180 Data Mining for Marketing, Sales, and Customer Relationship Management**

Spring. 1.5 credits. J. Gehrke. Introduces modern data management systems and their use in the business context. Focuses on the capabilities of modern database systems and their role in the enterprise instead of going into technical detail. Topics include data models and modeling, query languages, transactions, database tuning, application servers, service-oriented and three-tier architectures, capacity planning, and data mining. Students perform several hands-on exercises involving a commercial database system.

NBA 5230 Data-Driven Businesses

Spring. 1.5 credits. J. Gehrke. The course will cover management challenges and strategy for businesses where data is a strategic asset. Topics include (1) how to create value from data through tools such as data management, search, and data mining; and (2) management challenges in data-centric businesses, especially managing businesses in markets with network effects such as search online advertising, and social networks.

NBA 6000 The Strategic Role of Information Technology

Fall. 3 credits. D. Huttenlocher. Beyond the hype surrounding the rise and fall of the dot-com era, information technology has had a wide-ranging impact on business activities. For instance, search costs and transaction costs have plummeted, while concurrently new ways of pricing and of organizing commercial transactions have emerged. Such changes are affecting how firms are managed as well as how they interact with their customers, employees, and business partners. This course explores how firms can use information technology to create business value and looks at strategies that can

help ensure they capture part of that value. Examines small and large companies in a variety of industries, including financial services, travel, retail, software, and manufacturing. Prior knowledge of information technology is not presumed; relevant technologies are covered in class or in assigned readings. The course format is a combination of lectures and cases.

NBA 6010 Electronic Commerce

Spring. 3 credits. L. Orman. Electronic commerce, the use of information technology in conducting economic transactions and managing businesses over computer networks, has captured public attention because of its wide-ranging implications for businesses, markets, public institutions, and the general public. Electronic commerce involves a wide variety of cooperating technologies (e.g., communications, networks, databases, expert systems, and multimedia) and affects a wide variety of managerial issues. It created a new emphasis on information technologies and systems in management; led to the development of new technologies and new combinations of existing technologies to support management; and occasionally radically altered business practices and the role of management. Students in this course learn to conduct economic transactions and manage businesses on the Internet. All major technical and managerial issues are covered through computer exercises on the Internet and case studies and examples of businesses on the Internet.

NBA 6020 Commercialization of Fundamental Technologies

Spring. 3 credits. E. Fitzgerald. Students explore in-depth projects based on a particular fundamental technology. Students are expected to investigate the science and technology and the strategic value of the technology via cross-disciplinary student teams; student teams will explore potential applications for fundamental advances and determine intellectual property related to the technology and applications. Students map progress with presentations, and are expected to create an end-of-term document enveloping technology, intellectual property, applications, and potential commercialization.

NBA 6080 Innovation in Pharma/Biotech: The Challenge of Change

Spring. 1.5 credits. B. Ganem and A. Biloski. NBA 6080 will introduce JGSM students to the scientific and business principles underlying the modern pharmaceutical and biotechnology industries. The course will examine organizational models in this corporate sector and help students more effectively perform financial and business evaluations of current and emerging technologies. The course will be organized into therapeutic modules, with guest speakers presenting unique perspectives on therapeutic developments in these areas. Each student will participate in a team project whose goal is to identify a therapeutic product or licensing/acquisition opportunity that would be of interest to a specific major pharma company. Course grades will be based upon the consistency and persuasiveness of both business and technical arguments.

NBA 6100 Technology Management, Bio, Info, Nano

Fall. 1.5 credits. D. Huttenlocher.

This course will introduce students to some of the current trends in modern biotechnology, information technology, and nanotechnology, and consider cross-cutting issues such as new technology adoption, business models for new technologies, and bridging the gap between scientific invention and business innovation. This course will be a "capstone" course that spends two weeks on bio/tech/pharma, two weeks on materials/nanotech, and two weeks on info tech. Scientific and technological discoveries will continue to drive advances in a broad range of industries. The wide array of technologies in the biological sciences, information technology, and advanced materials present numerous challenges to managers attempting to map future growth in industries that are driven technological advances.

NBA 6120 Disruptive Technologies

Fall. 1.5 credits. Priority given to students with technology of science backgrounds. Prerequisite: working knowledge of computers. D. Greenberg. Begins by presenting historical technological advances that created major paradigm shifts for communications. Presents advances in computer technology emphasizing the fundamentals behind the increases in processing power, video and computer graphics capabilities, and network transmission. The second half of the course covers the effect of these scientific advances on many discipline-specific areas including photography, the film industry, the entertainment and animation industry, television broadcasting, publishing, and the computer industry itself. Sessions are devoted to the social and legal issues rising from the rapid advances in electronic communication. In attempting to predict the disruptive changes of the future, it is best to understand the technologies themselves. The course is especially tailored to a business school and industrial concerns and has interactive live demonstrations at the state-of-the-art laboratory of the Program of Computer Graphics. No prior knowledge of computer science is required.

NBA 6520 Commercializing University Science and High Technology

Spring. 1.5 credits. W. Sine. How do scientists take their research to the marketplace? How do scientists and entrepreneurs find and create market opportunities? Commercializing University Science and High Technology will tackle these issues and apply our learning to projects drawn from Cornell labs and local high-tech firms. This course is designed to help students to identify, evaluate, and obtain control over technology opportunities. The course focuses on three themes: (1) the source, discovery, and evaluation of technological opportunities on a university campus, (2) increasing the efficiency of the innovation process to produce new technologies that satisfy customer needs, and (3) the different mechanisms available to appropriate returns from technology. We will use readings, cases, and discussions with practitioners to examine this phenomenon. After completing this class, students will be familiar with basic principles related to technology entrepreneurship and will have gained a deeper understanding of the technology commercialization process here at Cornell. The class will be composed of a select group of graduate students drawn from science, engineering, law, medicine, and the Johnson Graduate School of Business (enrollment is limited).

NBA 6650 The Strategic Management of Technology and Innovation

Spring, 3 credits. W. Sine.

This is an introductory management course covering the strategic management of technology and innovation in established firms as well as start-up organizations. This course is designed for students who may someday work in, consult for, and/or create firms whose primary product is fundamentally related to technology or innovation. The course typically includes both M.B.A. students and graduate students in science. We will start by examining how industries are transformed by new technologies and how these patterns of industrial change generate both opportunity and high rates of firm failure. We will then explore the questions: Why do some technology leaders fail; and how do technology innovators successfully take on and replace incumbent firms? This will lead us to an examination of internal management issues, focusing on the design of innovative organizations: designing reward systems, managing growth, overcoming resistance to change, and using organizational culture to promote innovation.

Management and Organizations**NBA 5220 International Negotiations**

Spring, 1.5 credits. Staff.

This course focuses on negotiation in the global business setting. It will cover the negotiation concepts dealt with in NBA 6660 (Negotiations) and NBA 6820 (Negotiation Essentials). In addition, it will investigate issues that can be particularly troublesome in the global setting, including: currency, venue for dispute resolution, and ethics that are unique to the international arena; parties at the cross-cultural negotiation table; and how culture affects negotiators' interests and priorities and strategies. The capstone exercise is a real-time email negotiation with students in Beijing, China.

NBA 5290 Executing Successful Corporate Strategy

Spring, 1.5 credits. Prerequisite: NCC 5090. O. Khessina.

Firms evolve, grow, and change through mergers and acquisitions, as well as through the internal creation of new divisions or subsidiaries. As promising as these pathways can sound, as most people know, the success rate of these efforts is quite poor. In fact, most mergers and acquisitions fail to recover their costs. We will explore the central and critical challenge in corporate strategy, which is to create corporate advantage through investments in a set of businesses that are better off for being commonly owned. We will focus on features of the firm that interfere with or support these efforts, including the role of the culture, the role of organizational capabilities, and the role of existing social, communication and power networks, among others. By the end of the course, you should be able to examine a firm and offer answers to three main questions: (1) What factors should inform the firm's decision to diversify? (2) What is the right portfolio of businesses for the firm? (3) How can diverse businesses be integrated to achieve strategic advantage for a corporation? The course is relevant for students who plan to pursue a managerial career in large corporations, intend to start and sell a new business, or plan to work in the investment or consulting industries.

Students interested in the managerial aspects of mergers and acquisitions, divestitures and internal development will find the course especially useful.

NBA 5880 Critical Thinking for Business Leaders

Spring, 1.5 credits. R. Mish.

This course is based on the proposition that leading well requires thinking well—that is, in order to succeed in any business leadership role, you must learn, exhibit, and model critical thinking skills to organizational stakeholders: your colleagues, supervisors/senior executives, and clients/customers. We spend the first few class sessions looking at a series of brief articles that attempt to advance arguments in favor of a particular business proposition, and we learn how to examine these arguments critically, including by evaluating the strength and limitations of the evidence presented and by identifying and articulating the best counter-arguments to the positions offered. We then spend the remainder of the course applying these critical thinking skills to a set of business cases, using a Strategic Thinking Problem-Solving framework. By the end of the course, the goal is for you to be able to approach business problems in a systematic and critically thoughtful way, and to produce and communicate a problem solution that is well-reasoned, well-received by ultimate decision makers, and likely to be implemented with success by the group/organization that you are leading.

NBA 6280 Strategic Change and Renewal

Fall, 1.5 credits. Prerequisite: NCC 5040. G. Dowell.

Today's organizations are beset by change, and if you want to have a real impact on your company, you must be ready to deal with changes stemming from a variety of internal and external forces. This course will give you the tools to think more systematically about the challenges of managing change, by considering (a) the impetus for the change, and (b) the systemic implications of the change.

NBA 6540 Power and Politics

Fall, 1.5 credits. E. Mannix.

Nothing is more frustrating than having a great idea and not having the political capital to get it recognized and implemented. This course is aimed at providing you with the political intelligence to succeed in an organization. This course aims to: 1) improve your ability to diagnose the underlying distribution of power in organizations, 2) allow you to practice strategies for building your own personal power, and 3) show you how to be fluent in multiple techniques for influencing others.

NBA 6630 Managerial Decision Making

Fall, 3 credits. J. Russo.

This course attempts to make its participants better managerial decision makers. However, most students find that the course applies equally well to their personal decisions. There are two other objectives. The first is to convey an enduring understanding of decision concepts, skills, and tools that, taken as a whole, comprise a troubleshooter's guide to dealing with the uncertainty, complexity, and conflict of the professional world. The second is to provide a framework for a good decision process in which all of the decision concepts, skills, and tools fit coherently. The

pedagogical approach uses lectures, in-class exercises, and applications.

NBA 6660 Negotiations

Fall, spring, 3 credits. Staff.

Judgment is the art and science of transforming perception into thought or opinion. Negotiation is the art and science of securing agreements between two or more interdependent parties. The purpose of this course is to understand the theory and processes of negotiation as it is practiced in a variety of settings. It is designed to complement the technical and diagnostic skills learned in other courses. A basic premise is that while a manager needs analytical skills to develop optimal solutions to problems, he or she also needs a broad array of negotiation skills for these solutions to be accepted and implemented. The course highlights the components of an effective negotiation and teaches students to analyze their own behavior in negotiations. It is largely experiential, giving students an opportunity to develop their skills by participating in negotiations and integrating their experiences with the principles presented in the assigned readings and course discussions.

NBA 6680 Leading Teams and Organizations

Fall, 3 credits. Priority given to M.B.A.s. Staff.

Focuses on general principles for successfully leading teams and organizations (the personal development course is NBA 5700). Draws on the latest research in team decision making and organizational leadership to address questions such as: what is the difference between leadership and management? how does a leader establish trust and commitment to an organization? and how do leaders transform organizations? Consists primarily of case studies of leaders but also includes some experiential and group activities. Grading is based on class participation, group case analyses, and a final individual case analysis.

NBA 6700 Becoming a Leader

Spring, 1.5 credits. J. Detert.

This course explores the complex process of "becoming a leader" by systematically uncovering beliefs and myths about leadership and rigorously examining how they hold up to the scrutiny of critical thinking, analysis, and research. Each class will address a number of important questions about leadership. We will generally use case studies and videos to first illustrate a topic by focusing on a specific leader and decision or dilemma faced by that leader. We will then abstract from the specific to the general by discussing the principles and research findings pertaining to that aspect of leadership. Students should also develop a significantly enhanced understanding of their own leadership strengths and objectives because the course requires personalization of concepts via a number of self-reflections and exercises.

NBA 6710 Business Ethics

Fall, spring, 1.5 credits. D. Radcliffe.

Poor moral judgment can ruin a manager's career or even sink a company. In general, an organization cannot survive without the trust of numerous stakeholders, and ethical lapses destroy trust and threaten vital stakeholder relationships. In today's volatile and fiercely competitive business environment, a manager must be able to identify and effectively resolve ethical issues that inevitably arise in the

pursuit of business (and career) objectives. This course is designed to enhance students' skills in moral reasoning as it applies to managerial decision making. It begins by examining normative concepts and principles that typically enter into moral reasoning, then uses those concepts and principles to analyze cases. Discussions seek to understand the moral issues confronting the decision makers in the cases and explore how those issues might be addressed in ethically responsible ways.

NBA 6760 Organizing for Strategic Advantage

Spring, 1.5 credits. Prerequisite: NCC 5090. O. Khessina.

Among the critical tasks facing any senior manager are the creation, evaluation, and implementation of a business unit's strategy. NCC 5090 (Strategy Core) and NBA 5790 (Cases in Business Strategy) teach students tools of creation and evaluation of strategies. This course is complementary and will offer frameworks for understanding ways of strategy implementation. Specifically, it will provide conceptual tools for designing and changing organizations given the strategic choices that have already been made. It will place special emphasis on organizational and human resources issues, hence the name, "Organizing for Strategic Advantage." The course is particularly relevant for students who are (1) thinking about working in the consulting industry; (2) planning to manage and lead firms; or (3) planning to found and own start-up companies.

NBA 6820 Negotiation Essentials

Spring, 1.5 credits. S. Spataro and K. O'Connor.

Judgment is the art and science of transforming perception into thought or opinion. Negotiation is the art and science of securing agreements between two or more interdependent parties. The purpose of this course is to understand the theory and processes of negotiation as it is practiced in a variety of settings. This course is designed to complement the technical and diagnostic skills learned in other courses at the Johnson School. A basic premise of the course is that while a manager needs analytical skills to develop optimal solutions to problems, a broad array of negotiation skills is needed in order for these solutions to be accepted and implemented. The course will highlight the components of an effective negotiation and teach students to analyze their own behavior in negotiations. The course will be experiential, allowing students to develop their skills by participating in negotiations and integrating their experiences with the principles presented in the assigned readings and course discussions.

Marketing

NBA 6170 Emerging Technology Marketing

Spring, 1.5 credits. Prerequisite: Graduate Students. B. LaPerle.

An overview of how successful companies combine a deep understanding of unmet customer needs with a key emerging and enabling technology to create significant new market and shareholder value. A proactive and repeatable 10-step Market Development Planning process will be described with special emphasis on tools and techniques that link industry and competitor technology

trends with unmet customer needs. This course will give prospective Brand Managers, Product Managers, Business and Engineering Managers the conceptual and operating tools to proactively identify, and successfully bring from the R&D lab to the marketplace, new differentiated Value Propositions.

NBA 6200 Marketing Research

Spring, 3 credits. Prerequisites: NCC 5010 and NCC 5030 or equivalent. Y. Park.

Deals with marketing research as a critical support function in corporations. The broad objective is to provide a fundamental understanding of marketing research methods employed by better-managed firms or proposed by leading academicians. The course is aimed at the manager, the ultimate user of marketing information, who is responsible for the scope and direction of research activities involved in obtaining, analyzing, and interpreting results of research. Covers the use of secondary sources of marketing information for designing studies and collecting primary data. Students are exposed to up-to-date methods in research design, qualitative research, measurement, data collection, and analysis. The emphasis is on evaluating research methods and on interpretation and use of results rather than on mathematical derivations. Students are also exposed to the practical side of marketing research through case studies, problem sets, and projects.

NBA 6210 Integrated Marketing Communications (also HADM 6649)

Fall, 3 credits. L. Pearo.

This course is designed to provide students with the framework and skills required to design, manage, and evaluate integrated marketing communication programs. Over the past decade, the number of communication options available to consumers, and hence to organizations, has grown exponentially. With so many different avenues for communication to, from, and among consumers, organizations must approach the communication task with the objective of creating a unified message that is consistent, coherent, and effective across all media—an integrated marketing communications program. Through class exercises, case studies, advertising critiques, online observation and participation, and teamwork on a simulated campaign, students will master the skills necessary for marketing campaign management.

NBA 6220 Marketing Strategy

Fall, 3 credits. Prerequisite: NCC 5030. Staff.

A sound marketing strategy is essential for the long-term success of a firm. Marketing strategies, while guided by environmental conditions, also seek to anticipate, exploit, and sometimes shape changes in the environment to gain competitive advantage. This requires an understanding of how customer needs evolve, how product-market boundaries shift, and how competitors are likely to react. The strategic roles of existing and new products need to be assessed, appropriate resource allocations made, and marketing strategies developed to ensure sustained growth. Successful development of marketing strategy requires an equal measure of analytical and creative thinking. This course introduces students to various concepts and analysis methods of defining opportunities and threats implicit in dynamic environments and to the process of formulating a long-term marketing strategy for a multiproduct

organization. Students will learn about the theoretical and applied perspectives of marketing strategy from readings, competitive marketing strategy simulation, developing a marketing strategy plan for a firm of their choice, case analyses, and guest speakers.

NBA 6260 Consumer Behavior

Fall, 3 credits. Staff.

Topics include factors that influence response to various kinds of advertising, purchase decisions, product perceptions, response to promotion, consumer satisfaction, and the basic methodologies for understanding consumer behavior.

NBA 6290 Current Topics in Marketing

Fall, 1.5 credits. Prerequisite: NCC 5030. J. Russo.

The focus of this course will be on emerging topics such as new media, measuring ROI for marketing, channel partnerships, and global marketing. Specific topics vary from year to year. For each topic, students will be required to do readings and apply the readings and class material to an assignment in class. Students will work on in-class assignments in groups and will submit an individual term paper.

NBA 6340 Customer Relationship Management

Spring, 1.5 credits. Y. Park.

The course is aimed at managers who are interested in pursuing activities in CRM built around the notion of customer centricity. The principal objectives of the course are to emphasize how CRM can help accomplish strategic initiatives and improve firm profitability, to develop essential skills using the statistics program, and to implement strategic initiatives in CRM. Students will be exposed to the practical side of CRM through case studies and hands-on exercises.

NBA 6390 Data-Driven Marketing

Spring, 3 credits. S. Gupta.

Deals with the use of data to make marketing decisions. Introduces concepts, methods, and applications of decision modeling to address marketing issues such as segmentation, targeting, positioning, promotions, advertising, and sales force decisions. Unlike marketing courses that focus on conceptual material, this course provides skills to translate conceptual understanding into specific operational plans—a skill in increasing demand in organizations today. The course is particularly valuable to students planning careers in management consulting, marketing, and market research. It is designed for students who have some background in quantitative methods and have a willingness to deal with mathematical concepts.

NBA 6930 Strategy and Tactics of Pricing

Spring, 3 credits. S. Gupta.

Pricing is a critical management decision that has both strategic and tactical elements. The objective of this course is to introduce participants to proven techniques and frameworks for assessing and formulating pricing strategy and tactics. A marketing manager responsible for pricing needs to understand economic, psychological, and organizational factors. This course revolves around understanding how to make effective pricing decisions, while keeping in mind these factors. Some of the topics to be covered include the analysis of relevant costs, economic value analysis (EVA), measurement

of price sensitivity, techniques for price differentiation, competitive pricing, and revenue management. This course should be useful for those pursuing careers in marketing, general management, and consulting.

Operations Management

NBA 6410 Logistics and Manufacturing Strategy

Spring. 3 credits. Prerequisite: NCC 5080 or permission of instructor. Staff.

Covers supply-chain integration, which involves strategic management of the value chain from materials to customer. Students discuss operations strategy issues that are important to both manufacturing and service organizations. The course emphasizes written and oral communication skills. About a fourth of the classes are spent on case studies that are analyzed by small groups. There is a midterm and final exam, but the majority of the grade is evaluated based on a course project, case analyses, and a supply chain simulation assignment that allows students to apply course topics in an experiential-learning setting.

NBA 6430 Managerial Spreadsheet Modeling

Fall, spring. 1.5 credits. T. Janosi.

The goal of this hands-on, lab-style course, taught in the Parker Center, is to develop proficiency in quantitative modeling within the environment of Microsoft Excel. Students develop and use spreadsheets to analyze a variety of business problems. The course has two principal components: spreadsheets and models. Spreadsheet topics include principles of good spreadsheet design, the effective presentation of information through spreadsheets (including graphical controls like sliding bars), and advanced Excel features (e.g., data validation, conditional formatting, scenarios). Modeling topics include the art of finding the appropriate level of modeling detail, practice in dealing with vague and unstructured problems, sensitivity analysis, and working with incomplete and unreliable data.

NBA 6470 Advanced Spreadsheet Modeling

Fall. 1.5 credits. T. Janosi.

The goal of this hands-on lab course, taught in the Parker Center, is to develop proficiency with Excel's quantitative tools of Solver (for optimization) and @Risk (for simulation). Building on their brief introduction in the Managing Operations core course, students use these advanced tools to analyze problems and cases in finance, marketing, and operations. Although the bulk of this course is devoted to case analysis, occasional lectures introduce some advanced features of these two powerful modeling tools, including integer and nonlinear programming and sensitivity analysis within optimization, and correlated random variables, scenario analysis, and valid statistical analysis within simulation.

NMI AND NRE RESEARCH AND ADVANCED STUDIES

NMI 5000 Directed Reading and Research

Fall, spring. 1–3 credits, variable.

Prerequisite: approval of advisors and faculty members involved in research. Staff. Students undertake special-interest research under the supervision of faculty members.

NMI 5030 Principles of Lean Six Sigma Process Improvement

Spring. 1.5 credits. Staff.

Lean Six Sigma is a robust and customer-focused process improvement methodology that develops value-creating processes in an organization while simultaneously reducing costs, defects, and lead times. This 20-hour course will (1) familiarize students with the Lean Six Sigma D-M-A-I-C process improvement roadmap, (2) introduce the technical fundamentals of Lean Six Sigma, and (3) demonstrate the use of Lean Six Sigma to support and accomplish an organization's strategic and operating plans. Students receiving a passing grade will receive a "Principles of Lean Six Sigma" course completion certificate.

NMI 5100 Multicultural Work Environments

Fall. 1 credit. Prerequisite: students whose summer internships are in a country other than that of their citizenship or prior work experience. Students should register for course in spring semester before internship after obtaining an internship offer and completing paperwork for course instructors. International students obtain and process work authorization forms with the International Students office. See Charlotte Rosen (435 Sage Hall) for further details about academic and immigration requirements for NMI 5100. C. Rosen and B. Mink.

Independent study. Promotes an understanding of the cultural assumptions we bring to the work environment and the effects of cultural differences on organizational interactions and productivity. Grades are posted in the following fall semester after completion of the course project (a 10-page paper).

DOCTORAL SEMINARS

NRE 5010 Capital Markets Research in Accounting

Spring. 1.5 credits. C. Nichols.

This course is designed to introduce topics in capital markets research and to develop students' ability to evaluate and generate archival research in accounting. In addition, the course is intended to develop students' understanding of common research designs used in archival studies and to identify potential research questions.

NRE 5020 Doctoral Seminar In Marketing

3 credits. Prerequisite: permission of instructor; graduate-level course in mathematical statistics or econometrics (may be waived in special cases). Staff.

Introduces students to empirical research in marketing. Although there is a strong focus on the historical development of econometric specifications of consumer choice models (with an emphasis on heterogeneity and

issues of dynamic consumption patterns) and Bayesian methods in marketing, the content is to some extent driven by the students.

Teaching is interactive, and each student is expected to present one of the papers studied to the rest of the class and to replicate the results of one of the papers, requiring him or her to write the necessary code and briefly discuss their findings. Students are welcome to sit in on parts of the class (e.g., the section on Bayesian Methods is broad enough that students from other areas may find the presentation useful).

NRE 5040 Judgment and Decision Making, Research and Accounting

3 credits. Prerequisite: Ph.D. students.

C. Nichols.

This seminar provides a rigorous and integrative exposure to those aspects of the literature in accounting, behavioral economics, and psychology that are related to questions of accounting and auditing theory and research.

NRE 5150 Behavioral Decision Making

Spring. 3 credits. Prerequisite: Graduate status. J. Russo.

This seminar focuses on decision making, judgment, and related topics. The initial topic is competing paradigms for research on decision making and the contributions to knowledge that each has made. Specific issues include (a) the kinds of decisions that each paradigmatic approach is most successful in explaining or predicting, (b) the forces that have impelled a shift of emphasis from one paradigm to another, and (c) the expected future productivity of the different paradigms. The remainder of the course is devoted to specific topics within decision research broadly construed, with their selection and priority guided by the interest of participants.

NRE 5170 Macro Organizational Theory Ph.D. Seminar

Spring. 3 credits. G. Dowell.

We review the major themes in macro OT research, paying particular attention to institutional theory and organizational ecology, but also including organizational learning, organizational identity, strategic management, and other topics.

NRE 5180 Marketing Model

Spring. 1.5 credits. S. Gupta.

This course is a study of model-based research in the marketing literature. The course aims to accomplish three main objectives: 1) Develop the student's knowledge of the technical details of various techniques for analyzing data. 2) Expose students to "hands-on" use of various computer programs for carrying out statistical data analyses. 3) Ask students to propose a model of consumer/market behavior that potentially constitute contributions to the literature.

NRE 5360 Doctoral Seminar on Introduction to Asset Pricing

Spring. 3 credits. M. Huang.

This course is an introductory Ph.D.-level course on the basic theories of asset pricing. It consists of four parts. The first part deals with individual choices under uncertainty, including expected utility theory, risk aversion, stochastic dominance, and two-period consumption-portfolio problems. The second part deals with equilibrium pricing theories, including implications of no arbitrage and stochastic discount factor, risk sharing,

aggregation, and consumption-based pricing in complete markets, mean-variance efficiency and the Capital Asset Pricing Model, and the Arbitrage Pricing Theory. We also explore the relation between these various pricing theories, and extend the treatment of individual consumption/portfolio problems and equilibrium pricing to a multi-period setting. In the third part, we review recent development in asset pricing by introducing some stylized facts and new theories. The fourth part gives a brief introduction to behavioral finance.

FACULTY ROSTER

- Bailey, Warren B., Ph.D., U. of California, Los Angeles. Prof., Finance
- BenDaniel, David J., Ph.D., Massachusetts Inst. of Technology. Don and Margi Berens Professor of Entrepreneurship
- Bhojraj, Sanjeev, Ph.D., U. of Florida. Assoc. Prof., Accounting
- Bierman, Harold, Jr., Ph.D., U. of Michigan. Nicholas H. Noyes Professor of Business Administration; Prof., Finance
- Bloomfield, Robert J., Ph.D., U. of Michigan. Prof., Accounting
- D'Souza, Julia, Ph.D., Northwestern U. Assoc. Prof., Accounting. Director of Graduate Studies
- Detert, James R., Ph.D., Harvard U. Asst. Prof., Management and Organizations
- Dowell, Glen W. S., Ph.D., U. of Michigan, Asst. Prof., Management and Organizations
- Dyckman, Thomas R., Ph.D., U. of Michigan, Ann Whitney Olin Professor of Accounting; Emeritus
- Farahat, Amr A., Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Operations Management
- Frank, Robert, Ph.D., U. of California, Berkeley. Prof., Economics, Henrietta Johnson Louis Professor of Management
- Gavirneni, Srinagesh (Nagesh), Ph.D., Carnegie Mellon U. Asst. Prof., Operations Management
- Grinstein, Yaniv, Ph.D., Carnegie Mellon U. Assoc. Prof., Finance
- Guar, Vishal, Ph.D., U. of Pennsylvania, Assoc. Prof., Operations Management
- Gupta, Sachin, Ph.D., Cornell U. Prof., Marketing, Henrietta Johnson Louis Professor of Management
- Hart, Stuart, Ph.D., U. of Michigan. S. C. Johnson Chair in Sustainable Global Enterprise; Prof., Management
- Hass, Jerome E., Ph.D., Carnegie Mellon U. James B. Rubin Professor of Finance, Krause Faculty Fellow in Real Estate; Prof., Finance
- Heffetz, Ori, Ph.D., Princeton U. Asst. Prof. of Economics
- Hilton, Ronald W., Ph.D., Ohio State U. Prof., Accounting
- Ho, Benjamin, Ph.D., Stanford U. Asst. Prof., Economics
- Huang, Ming, Ph.D., Stanford U. Prof. of Finance, Clifford H. Whitcomb Faculty Fellow
- Huttenlocher, Daniel P., Ph.D., Massachusetts Inst. of Technology. John P. and Rilla Neafsey Professor of Computing and Information Science and Business; Prof., Information Technology
- Isen, Alice M., Ph.D., Stanford U. S. C. Johnson Professor, Marketing
- Jarrow, Robert A., Ph.D., Massachusetts Inst. of Technology. Ronald P. and Susan E. Lynch Professor of Investment Management; Prof., Finance and Economics
- Johnson, Justin, Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Economics
- Kadiyali, Vrinda, Ph.D., Northwestern U. Prof., Marketing and Economics
- Khessina, Olga M., Ph.D., U. of California, Berkeley. Asst. Prof., Management and Organizations
- Leary, Mark T., Ph.D., Duke U. Asst. Prof., Finance
- Libby, Robert, Ph.D., U. of Illinois. David A. Thomas Professor of Management; Prof., Accounting and Management and Behavioral Science
- Mannix, Elizabeth, A., Ph.D., U. of Chicago. Prof., Management and Organizations Ann Whitney Olin Professor of Management
- McAdams, Alan K., Ph.D., Stanford U. Prof., Economics
- McClain, John O., Ph.D., Yale U. Prof., Operations Management; Emerson Electric Company Professor of Manufacturing Management
- Michaely, Roni, Ph.D., New York U. Prof., Finance; Rudd Family Professorship of Management
- Narayan, Vishal, Ph.D., New York U. Asst. Prof., Marketing
- Nelson, Mark W., Ph.D., Ohio State U. Prof., Accounting; Eleanora and George Landew Professor of Management
- Nichols, D. Craig, Ph.D., Indiana U. Asst. Prof., Accounting
- O'Connor, Kathleen, Ph.D., U. of Illinois. Assoc. Prof., Management and Organizations
- O'Hara, Maureen, Ph.D., Northwestern U. Robert W. Purcell Professor in Management; Prof., Finance
- Orman, Levent V., Ph.D., Northwestern U. Prof., Management Information Systems
- Park, Young-Hoon, Ph.D., U. of Pennsylvania. Assoc. Prof., Marketing
- Rao, Vithala R., Ph.D., U. of Pennsylvania. Deane W. Malott Professor of Management; Prof., Marketing and Quantitative Methods
- Robinson, Lawrence W., Ph.D., U. of Chicago. Assoc. Prof., Operations Management
- Russo, J. Edward, Ph.D., U. of Michigan. S. C. Johnson Family Prof., Management, Prof., Marketing and Management and Organizations
- Saar, Gideon, Ph.D., Cornell U. Assoc. Prof., Finance; Clifford H. Whitcomb Faculty Fellow
- Schneider, Henry S., Ph.D., Yale U. Asst. Prof., Economics
- Sine, Wesley, Ph.D., Cornell U. Asst. Prof., Management and Organizations
- Smidt, Seymour, Ph.D., U. of Chicago, Nicholas H. Noyes Professor of Economics and Finance; Professor of Finance, Emeritus
- Spataro, Sandra E., Ph.D., U. of California, Berkeley. Asst. Prof., Management and Organizations; Clifford H. Whitcomb Faculty Fellow
- Stayman, Douglas M., Ph.D., U. of California, Berkeley. Assoc. Prof., Marketing
- Swieringa, Robert J., Ph.D. U. of Illinois. Prof. of Accounting, Anne and Elmer Lindseth Dean Emeritus
- Thomas, L. Joseph, Ph.D., Yale U. Anne and Elmer Lindseth Dean, Prof. of Manufacturing and Operations Management
- Thomas, Manoj K., Ph.D., New York U. Asst. Prof., Marketing, Clifford H. Whitcomb Faculty Fellow
- Thomas-Hunt, Melissa, Ph.D., Northwestern U. Assoc. Prof., Management and Organizations
- Waldman, Michael, Ph.D., U. of Pennsylvania. Prof., Economics; Charles H. Dyson Professor of Management
- Weinbaum, David, Ph.D., New York U. Asst. Prof., Finance
- Yang, Nan, Ph.D., Columbia U. Asst. Prof., Operations Management
- Yehuda, Nir, Ph.D., Columbia U. Asst. Prof., Accounting
- Zhang, Xiaoyan, Ph.D., Columbia U. Asst. Prof., Finance

Lecturers

- Allen, Randy L., B.A., Cornell U. Sr. Lec., Strategy
- Andolina, Robert, M.B.A., Cornell U. Sr. Lec., Finance
- Biloski, Alan J. Ph.D., Cornell U. Sr. Lec., Finance
- Goldman, Melvin H., M.P.A., Princeton U. Lec., Management
- Hostetler, Michael, M.S., U. of Tennessee, Lec., Leadership
- Iankova, Elena A., Ph.D., Cornell U. Lec., International Business
- Katzenstein, Gary, Ph.D., Carnegie Mellon U. Sr. Lec., Global Business and Management and Organizations
- Milstein, Mark B., Ph.D., U. of North Carolina. Lec., Sustainable Global Enterprise
- Mink, Barbara E., M.A., Cornell U. Sr. Lec., Management Communications
- Mish, Risa, J.D., Cornell U. Lec., Management; Director, Leadership Skills
- Noble-Grange, Angela P., M.B.A., Cornell U. Lec., Management Communications
- Rosen, Charlotte, Ph.D., Cornell U. Sr. Lec., Coordinator, Management Communications
- Schneider, George T., B.M.E., Cornell U. Lec., Entrepreneurship
- Shulman, Zachary J., J.D., Cornell U. J. Thomas Clark Senior Lecturer of Entrepreneurship and Personal Enterprise, Sr. Lec., Entrepreneurship
- Suwinski, Jan H., M.B.A., Cornell U. Sr. Lec., Operations Management
- Szpiro, Daniel A., Ph.D., U. of Western Ontario, Sr. Lec., Accounting

Adjunct and Visiting Faculty

- Azis, Iwan J., Ph.D., Cornell U. Adjunct Prof., Economics
- Curtis, Rich, M.B.A., Cornell U. Visiting Lec., Finance
- Ellish, F. Warren, M.B.A., Cornell U. Visiting Sr. Lec., Marketing
- Fields, Tom D., Ph.D., Northwestern U. Visiting Lec., Accounting
- Fitzgerald, Eugene, Ph.D., Northwestern U. Visiting Prof., Management
- Fry, Michael J., Ph.D., U. of Michigan, Visiting Assoc. Prof.
- Ganem, Bruce, Ph.D., Columbia U. Adjunct Franz and Elisabeth Roessler Professor; J. Thomas Clark Professor of Entrepreneurship and Personal Enterprise
- Greenberg, Donald P., Ph.D., Cornell U. Adjunct Prof., Management Information Systems
- Gosse, Lois E., Ph.D., Cornell U. Visiting Sr. Lec., Economics
- Grossman, Dale A., J.D., American U. Sr. Lec., Tax and Business Law
- Hanks, James J., LL.M., Harvard U. Visiting Sr. Lec., International Management
- Janosi, Tibor, Ph.D., Massachusetts Inst. of Technology. Visiting Prof., Finance

Juran, David C., Ph.D., Cornell U. Visiting Asst.
Prof., Operations Management

Keller, Fred P., M.S., Rensselaer Polytechnic
Institute, Visiting Lec., Management

Marin, Richard A. M.B.A., Cornell U. Executive
in Residence in Asset Management; Visiting
Sr. Lec., Finance

Maydew, Edward L., Ph.D., U. of Iowa, Visiting
Prof., Accounting

McLeod, Poppy, Ph.D., Harvard U. Adjunct
Assoc. Prof., Management Communications

Nesheim, John L., M.B.A., Cornell U. Visiting
Lec., President, Aladdin Systems, Inc.

Peck, Nathan H., M.B.A., Cornell U. Visiting Sr.
Lec., Consulting

Radcliffe, Dana M., Ph.D., Syracuse U. Adjunct
Day Family Lec., Business Ethics

Raj, S. P., Ph.D., Carnegie Mellon U. Visiting
Prof., Marketing

Shackell-Dowell, Margaret B., Ph.D., U. of
Michigan, Visiting Lec., Accounting

Stepp, Pamela L., Ph.D., Cornell U. Visiting Sr.
Lec., Management and Organizations

Wansink, Brian, Ph.D., Stanford U. John S.
Dyson Professor of Marketing; Adjunct
Prof., Marketing

Zurack, Mark A., M.B.A., Cornell U. Visiting Sr.
Lec., Finance

LAW SCHOOL

ADMINISTRATION

Stewart J. Schwab, Dean and Professor of Law

Barbara J. Holden-Smith, Vice Dean and Professor of Law

Stephen P. Garvey, Associate Dean for Academic Affairs and Professor of Law

Claire M. Germain, Law Librarian and Professor of Law

Richard D. Geiger, Associate Dean, Communications and Enrollment

Anne Lukingbeal, Associate Dean and Dean of Students

Richard F. Robinson, Associate Dean for Administration and Finance

Karen V. Comstock, Assistant Dean for Public Service

Charles D. Cramton, Assistant Dean for Graduate Legal Studies

John R. DeRosa, Assistant Dean for Student and Career Services

Nan A. Colvin, Registrar

The Law School prepares attorneys for both public and private practice. Graduates are trained to provide the highest quality professional services to their clients and to contribute to the development and reform of law and legal institutions. The curriculum is designed to prepare students for admission to the bar in all American states and territories. Students who pursue the three-year Doctor of Law degree (J.D.) must have a bachelor's degree or equivalent. Students wishing to concentrate in international law may be admitted to a program leading to the J.D. "with specialization in international legal affairs." The Law School also offers a limited number of students an opportunity to earn both a J.D. degree and an LL.M. (Master of Laws) degree in international and comparative law.

Students may pursue combined graduate degree programs with the Johnson Graduate School of Management; the Department of City and Regional Planning of the College of Architecture, Art, and Planning; the School of Industrial and Labor Relations; the graduate divisions in economics, history, and philosophy of the College of Arts and Sciences; the Université de Paris I (Pantheon Sorbonne); L'Institut d'Etudes Politiques de Paris; and Humboldt University.

Each year a limited number of students from abroad pursue the LL.M. degree (Master of Laws) and the J.S.D. degree (Doctor of the Science of Law). A small number of law graduates also may be admitted as special students, to pursue advanced legal studies without seeking a degree. Students in other graduate programs and qualified undergraduate students registered with the university are welcome in many classes with the permission of the instructor. In addition, highly qualified undergraduates in the College of Arts and Sciences may register in the Law School during their senior year.

For further information, refer to the Law School web site, or contact the Office of the Registrar, Myron

Taylor Hall. Course descriptions are current as of April 2007. For updated law descriptions visit: www.lawschool.cornell.edu

FIRST-YEAR COURSES

LAW 5001 Civil Procedure

Full year. 6 credits. Letter grades only. K. M. Clermont, B. J. Holden-Smith, and F. F. Rossi.

An introduction to civil litigation, from commencement of an action through disposition on appeal, studied in the context of the federal procedural system. Also, a detailed consideration of federalism and ascertainment of applicable law; jurisdiction, process, and venue; and former adjudication.

LAW 5021 Constitutional Law

Fall. 4 credits. Letter grades only. J. Chafetz, M. Dorf, S. L. Johnson, and S. H. Shiffrin.

A study of basic American constitutional law, including structural aspects of the Constitution and certain of its rights provisions.

LAW 5041 Contracts

Full year. 6 credits. Letter grades only. A. Anghie, R. A. Hillman, N. Oman, and R. S. Summers.

An introduction to the nature, functions, and processes of exchange, contract, and contract law. The course focuses on the predominant rules and principles governing contract and related obligation, including the substantive reasons underlying the rules and principles.

LAW 5061 Criminal Law

Spring. 4 credits. Letter grades only. S. P. Garvey and J. Ohlin.

An introductory study of the criminal law, including theories of punishment, analysis of the elements of criminal liability and available defenses, and consideration of specific crimes as defined by statute and the common law.

LAW 5081 Lawyering

Full year. 4 credits. Letter grades only. J. Atlas, L. Freed, J. Mollenkamp, A. J. Mooney, U. H. Weigold, and M. A. Whelan.

Lawyering is a full-year course designed to introduce first-year students to lawyering skills, with primary emphasis on legal writing, analysis, research, and oral presentations. Assignments are usually set in the context of a simulated law office (or judge's chambers). In the fall semester, students write predictive memoranda that point out the strengths and weaknesses of their client's case. To prepare the memoranda, students may need to determine the facts of the case by conducting interviews or depositions. Acting as junior attorneys, students will also make an oral presentation to a supervising attorney. The spring semester focuses on persuasive advocacy. Students prepare a memorandum, motion, or brief for submission to a court and,

later, orally argue for their positions in a simulated court session. Throughout the year, students also learn the fundamentals of legal research. Instruction occurs not only in full-class sessions but also in individual conferences. Students receive extensive feedback on each major assignment.

LAW 5121 Property

Spring. 4 credits. Letter grades only. E. M. Penalver and L. S. Underkuffler.

This is a course in basic property law. It covers acquisitions of rights in property, estates in land, concurrent ownership, landlord/tenant relations, and regulation of land use.

LAW 5151 Torts

Fall. 4 credits. Letter grades only. V. Hans, M. Heise, J. A. Henderson Jr., and W. B. Wendel.

An introduction to the principles of civil liability in the tort field: intentional wrongs, negligence, and strict liability. Attention is also given to the processes by which tort disputes are handled in our legal system.

GRADUATE COURSES

LAW 6071 Advanced Legal Research—U. S. Legal Research for LL.M. Students

Fall (first 7 weeks of term). 1 credit. Graduate program grading—H, S, U. Graduate students only; limited enrollment. M. M. Morrison.

This course will introduce LL.M. students to basic legal research in U.S. materials that will be valuable to them in their course work at Cornell and in practice. The focus will be on understanding and finding primary legal sources, including statutory codes, session laws, administrative regulations, and court decisions, as well as explanatory materials, such as law reviews and treatises. To a large extent, instruction will use online materials that are most likely to be available to the students in their future careers. There will be short introductory lectures, as well as hands-on laptop and Reading Room sessions. Students will complete five assigned exercises using the resources learned in class, and there is no final exam. The final grade will be based on the five assigned exercises (20 percent each).

LAW 6221 Anglo-American Contract Law

Spring. 3 credits. Graduate program grading—H, S, U. Limited to graduate students. C. Thomas.

This course is designed for foreign-trained lawyers who are familiar with basic contract law in their own country. It surveys the Anglo-American common law of contracts and related civil obligations. The pedagogic approach focuses on the case method and is Socratically based, similar to the traditional first year course in Contracts. Graduate students who wish to study contract law would generally be expected to take this one-semester course. They are free to enroll

instead in the first-year Contracts course, but if they do so, they must take that course for the full year.

LAW 7991 Cornell Research Colloquium

Fall. 3 credits. Limited enrollment. Seminar course required for all first-year J.S.D. candidates. Also open first to L.L.M. students and then to J.D. students if places are available. Visiting scholars and exchange students from foreign institutions highly encouraged to attend in an unofficial capacity. Satisfies writing requirement. J.S.D. and LL.M. program grading—H, S, U. J.D. program, letter grades only. M. Lasser.

This seminar is a course in advanced academic research methodology. The colloquium is designed to prepare the students to engage in doctoral-level research, analysis and writing, especially in comparative and international contexts. How is the researcher to select an object or subject of investigation? How should she formulate research questions? How should she engage in the study of foreign and domestic legal institutions, doctrines and/or cultures? How is interdisciplinary work to be accomplished? The early portions of the course will involve discussing readings in comparative research methodology, including functionalism, Common Core analysis, legal transplant theory, historicism, law and development, legal pluralism, cultural analysis, colonial studies, and comparative institutionalism. In the latter portions of the course, students will present and critique their methodologically reflective research projects. A modest number of external speakers will be invited to present their work in progress for the purposes of generating methodologically oriented discussion.

LAW 6761 Principles of American Legal Writing

Fall, spring. 3 credits. Graduate program grading—H, S, U. Graduate students only; limited enrollment. L. Knight.

This course provides foreign-trained lawyers with an introduction to the American legal system and essential principles of legal writing in the United States. Students are afforded an opportunity to practice some of the forms of writing common to American legal practice, by drafting documents such as memoranda, and briefs, in the context of representing hypothetical clients. Students are given the opportunity to conference individually with the instructor and to rewrite assignments after receiving the instructor's comments.

LAW 8991 Thesis

Fall, spring. 5 credits. Limited to graduate students and students completing joint J.D.-LL.M. program. Graduate program grading—H, S, U. J.D./LL.M. program—Letter grades only.

Arrangements for a master's thesis are made by the student directly with a faculty member. A faculty member may require the student to submit a detailed outline of the proposed thesis, as well as a summary of previous writing on the subject or other appropriate information. The work is completed during the academic year under the supervision of a law faculty member.

LAW 9901 Graduate Research

Fall, spring. Limited to J.S.D. students.

UPPERCLASS COURSES

LAW 6001 Accounting for Lawyers

Spring. 2 credits. S-U or letter grades. R. A. Sarachan.

This course is designed to introduce students to the basic concepts and fundamentals of financial accounting. It will focus on (1) accrual accounting concepts, principles and conventions, (2) the presentation of financial statements (balance sheets, income statements, statements of cash flow), (3) the interpretation and analysis of financial statements, and (4) the use and misuse of accounting information. The goal of the course is to enable students to critically review a company's financial statements. The course is intended primarily for students with little or no prior background in bookkeeping or accounting and is limited to students who have had no more than 6 credit hours of accounting (or its equivalent) or permission of instructor.

LAW 6011 Administrative Law: The Law of the Regulatory State

Fall, spring. 3 credits. Limited enrollment. Letter grades only. J. J. Rachlinski [fall], C. R. Farina [spring].

An introduction to the constitutional and other legal issues posed by the modern administrative state. Topics include: procedural due process, separation of powers, procedural modes of administrative policymaking; judicial review of agency action; and the oversight and control relationships between agencies and Congress or the President. The course provides a working familiarity with the fundamentals of administrative procedure, as well as a larger inquiry into the role of agencies in our constitutional system—and the effect of legal doctrine on shaping that role.

LAW 6023 Advanced Civil Procedure

Spring. 2 credits. S-U or letter grades. K. M. Clermont.

A complement to the first-year civil procedure course. Topics touched on in the first year are studied in greater depth: pretrial procedure, including pleadings, discovery, pretrial conferences, and summary judgment; trial procedure, with special emphasis on judge-jury problems; and, if time permits, appeals. The context of study is the federal procedural system.

LAW 6081 Animal Law

Fall. 2 credits. S-U or letter grades. D. Campbell.

This cutting-edge and constantly evolving field of law will explore the statutory and case law in which the legal, social, or biological nature of nonhuman animals is an important factor. The course encompasses companion animals, wildlife, and animals raised for food, entertainment, and research, and will survey traditional law topics like torts, contracts, criminal law, constitutional law, and federal laws as they intersect with animals. Grade will be based on participation in open-minded discussions and a paper.

LAW 6101 Antitrust Law

Fall. 3 credits. Letter grades only. G. A. Hay.

The antitrust laws of the U.S. protect competitive markets and limit the exercise of monopoly power. Topics include: price fixing, boycotts, and market allocation agreements among competitors; agreements between suppliers and customers; joint ventures; monopolization; and mergers.

LAW 6121 Bankruptcy

Fall. 3 credits. Letter grades only. T. Eisenberg.

Selected topics in the law of bankruptcy. An overview of the various bankruptcy chapters and a detailed study of the business bankruptcy provision of most general applicability. The relationship between the rights of an Article 9-secured creditor and the bankruptcy trustee's power to avoid liens. Related topics in the enforcement of money judgments and the law of fraudulent conveyance.

LAW 6131 Business Organizations

Fall, spring. 4 credits. S-U or letter grades. Limited enrollment. Fall, R. C. Hockett; spring, C. K. Whitehead.

An introduction to the legal rules and principles, as well as some of the economic factors, that underlay the conduct of productive enterprise in the United States. A principal focus will be upon the large, publicly traded corporation that dominates much of the U.S. business environment—in particular, its control and the potentially conflicting interests that the form must mediate. Legal topics to be covered: basic fiduciary obligations, shareholder voting rights, shareholder suits, corporate control transactions, and insider trading. We shall also devote some attention to closely held corporations and other business forms.

LAW 6150 The City and the World: The Legal Aspects of the Globalization of Cities

Fall, first half of semester. 1 credit. S-U or letter grades. Y. Blank.

Local governments are increasingly becoming major actors in the emerging global legal order. The United Nations, the World Bank, the European Union, and other international and transnational institutions are beginning to view local governments as vehicles for the advancement of policies on a global scale. Local governments are transforming into objects for international regulation and are increasingly used as a means for disseminating and implementing global political programs, financial schemes, and governance strategies. The traditional legal focus on state actors is shifting on to local governments, giving them independent legal status in the new global order. Local governments are obtaining international duties, powers and rights: enforcing international standards; forming global networks involved in the creation of international standards; and becoming objects of international regulation. It has indeed become impossible to understand globalization and its legal ordering without considering the role of localities: they have become prime vehicles for the dissemination of global capital, goods, work force, and images. The course will investigate these developments through an examination of various legal documents and institutions such as the EU, the UN and the World Bank and will focus on the transformations that local legal regimes concerning localities (i.e., local government law) are undergoing (or are expected to undergo) as a result thereof.

LAW 6161 Comparative Law: The Civil Law Tradition

Fall. 3 credits. S-U or letter grades. M. Lasser.

This course introduces students to the institutional and conceptual organization of "civil law" legal systems (which govern almost all of Western and Eastern Europe and Latin

America, as well as significant portions of Africa and Asia). The course will therefore provide a broad overview of "civilian" private law and procedure, criminal procedure, administrative law, and constitutional law. The course is particularly interested in the differences between common law and civil law understandings of the relationship between law-making, legal interpretation, and the judiciary.

LAW 6191 Conflict of Laws

Fall. 3 credits. S-U or letter grades.
B. J. Holden-Smith.

This course focuses primarily on the choice-of-law methods used by courts in the United States to decide the applicable law in cases that, in their parties or events, involve more than one state or country. The course examines in detail the nature, logic, and constitutionality of such methods. In addition, the course devotes substantial attention to recognition and enforcement of judgments and, in particular, to the obligation imposed by the Constitution's Full Faith and Credit Clause to respect the judgments of other states' courts.

LAW 6201 Constitutional Law II: The First Amendment

Spring. 3 credits. S-U or letter grades.
S. H. Shiffrin.

A comprehensive discussion of freedom of speech, press, and association. The free-exercise-of-religion clause and the establishment clause of the First Amendment will also be treated to some extent.

LAW 6263 Criminal Procedure—Adjudications

Fall. 2 or 3 credits. S-U or letter grades.
Prerequisites: none. Students who have previously taken Criminal Procedure from Professor Blume are eligible to take this course for 2 credits due to some overlap in course content. Other than first class, students who were enrolled in Criminal Procedure with Professor Blume during fall of 2008, may—but are not required to—attend classes where material covered previously in Professor Blume's Criminal Procedure course is discussed. Students who have not taken Professor Blume's Criminal Procedure class will take class for 3 credits. J. H. Blume.

This course will primarily focus on the adjudication phase of the criminal process including pretrial detention, guilty pleas, jury composition and selection, fair trial procedures, double jeopardy and collateral review. However, the first third of the class will address various topics relating to the right to counsel.

LAW 6264 Criminal Procedure—Investigations

Fall. 3 credits. S-U or letter grades.
S. F. Colb.

Criminal Procedure: Investigations examines the constitutional law that governs police attempts to solve crime and bring perpetrators to justice. The course considers the role of the Fourth Amendment prohibition against unreasonable searches and seizures as well as the Fifth Amendment ban on compelled self-incrimination, in guiding police behavior and in structuring the trials that follow constitutional violations. Students will evaluate the wisdom and constitutional validity of the Fourth Amendment exclusionary rule, which prohibits the introduction of evidence obtained as a result of an unreasonable

search, and the well-known *Miranda v. Arizona* decision as it has evolved over time.

LAW 6301 Directed Reading

Fall, spring. 1 or 2 credits. S-U grades only. Arrange directly with instructor. Specific credit limits apply—carefully review the registration form available from online registration site or registrar's office.

An examination of a topic through readings selected by arrangement between the instructor and an individual student or group of students (not exceeding eight).

LAW 6661 Constitutional Law of the European Union

Spring. 3 credits. S-U or letter grades.
M. Lasser.

This course introduces students to the law and institutions of the European Union. It examines the composition, organization, functions and powers of the Union's governing bodies; analyzes the Union's governing treaties and constitutional law; and studies the Union's decision-making processes. The course also explores broader questions of political, economic and legal integration, such as the proper relation between the Union's law and the domestic law of the Union's Member states, and the desirability and feasibility of using the E.U. as a model on which to pattern other transnational agreements.

LAW 6732 Cross Cultural Negotiations

Fall. 2 credits. S-U grades only.
Prerequisite: LL.M.s and third-year students more likely to benefit than second-year students in fall term. Limited enrollment. Course meets Nov. 12, 13, 14, 19, 20, and 21, 2009. Attendance mandatory for all course sessions. D. Plant.

This Cross Cultural Negotiation workshop is designed to give law students an intensive opportunity to develop negotiation skills which can be used in the global market place to create and repair relationships and to manage conflict. Classes will consist primarily of interactive negotiations and communication exercises, together with some lectures. Problems to be negotiated will have some rudimentary IP overtones.

LAW 6731 Dispute Resolution: Negotiation, Mediation and Arbitration

Fall. 2 credits. Letter grades only. Limited enrollment. J. P. Meyer and S. G. Yusem.
During the past decade, the field of alternative dispute resolution has virtually transformed the practice of law. Today, every lawyer has a professional responsibility to his or her clients to consider the most appropriate process available to resolve issues. The course will explore the characteristics of negotiation, mediation and arbitration as well as the ethical concerns inherent in them, employing interactive and videotape dispute simulations, enabling the student to engage as a negotiator, dispute resolution advocate, mediator, and arbitrator.

LAW 6311 Education Law

Spring. 3 credits. S-U or letter grades.
M. Heise.

This course focuses on selected legal issues that arise in the public and private education context, with emphasis on the elementary and secondary school setting. Topics considered include the legal and policy dimensions of the rights of students, parents, educators, and the state with respect to such issues as access to, control over, and regulation of the education setting and institutions. Issues germane to

equal education opportunity, school finance, and school governance and regulation receive particular attention.

LAW 6361 Environmental Law

Spring. 3 credits. Letter grades only.
Recommended prerequisite: Administrative Law. J. J. Rachlinski.

The course surveys the major environmental laws, with a primary focus on federal statutes. Emphasis will be placed on the various sources of liability to both individuals and corporations from common law, statutory provisions, administrative regulation, and enforcement policy. Corporate successor liability through mergers and acquisitions will be included, including the increasing importance of performing a full range due diligence review for environmental conditions in such transactions. Special attention is paid to the economic, social, and political obstacles to efficient regulation of the environment.

6392 Ethics and Corporate Culture (also NBA 5140)

Spring. 2 credits. Letter grades only.
Satisfies professional responsibility requirement. Offered second half of spring semester. Limited enrollment. D. Radcliffe and B. Wendel.

In the high-pressure worlds of business and law, all too often good people do bad things. In many cases, the unethical behavior is due in part to a toxic corporate culture. The attitudes, values, and practices that prevail in their organizations induce otherwise ethical employees to take actions that violate widely shared norms of conduct. Such behavior can be costly—even disastrous—leading to ruined careers, tarnished corporate reputations, and legal liability for the individuals and their companies. In an environment where "only results matter," it can be difficult for a new M.B.A. or law school graduate to recognize the risks. If she does see the dangers, she may still find it hard to avoid them. This course seeks to help M.B.A. and law students understand how a firm's culture can tempt—or push—employees into unethical behavior. It also considers how employees can meet ethical challenges posed by their firms' cultures and what leaders can do to build ethically healthy cultures.

LAW 6401 Evidence

Fall, 3 credits. Letter grades only. Limited enrollment. F. F. Rossi.

The rules of evidence in civil and criminal cases with emphasis on relevance, hearsay, authentication, witnesses, experts, and confrontation. The course focuses on the Federal Rules of Evidence, with some attention to how they diverge from the common law.

LAW 6401 Evidence

Spring, 4 credits. S-U or letter grades.
S. F. Colb.

This course examines the rules that govern attorneys' trial presentations in criminal and civil cases. Beginning with the requirement that every piece of evidence offered be relevant to a fact that bears on the dispute, the course surveys the obstacles that confront attorneys offering proof at trial. We consider the rules barring character evidence, proof of sexual propensity, and hearsay, among others. The Federal Rules of Evidence (FRE) represents the main source of law for the course, though the case method is used and will accordingly, on occasion, expose students to state analogues of the federal rules. The

exam in this course is entirely objective, i.e., true-false and multiple choice.

LAW 6421 Family Law

Spring. 3 credits. S-U or letter grades.
C. G. Bowman.

Broadly understood, family law is the study of state-imposed rules regulating intimacy and intimate relationships in society. In this course we evaluate our assumptions and beliefs about the appropriateness of a number of current laws regulating families. Substantial attention is devoted to the social and legal consequences of marriage dissolution, including child custody, child support, property distribution, and spousal maintenance. Other topics considered include: the legal significance of marriage rights and obligations; private ordering within the marital context; non-marital relationships and their regulation; and the legal rights of parents, children, and foster parents in situations of abuse and neglect.

LAW 6431 Federal Courts

Spring. 4 credits. S-U or letter grades.
Prerequisite: Constitutional Law and second semester of Civil Procedure.
Students without such background should consult with the instructor. Knowledge of the basic doctrines of administrative law is very useful, although not a strict prerequisite. M. Dorf.

This course examines the various constitutional, statutory, and judge-made doctrines that control access to the federal courts to vindicate federal rights. It is particularly valuable for those planning a career in public interest or the public sector, anyone else expecting to litigate extensively in federal court, and students who have or hope to obtain a judicial clerkship. Topics covered include: case or controversy limitations, including standing; constitutional and statutory limits on jurisdiction; causes of action for constitutional and statutory rights, including 42 U.S.C. §1983 and Bivens actions; bars to such actions, including sovereign immunity and abstention doctrines; and habeas corpus.

LAW 6441 Federal Income Taxation

Fall, spring. 4 credits. S-U or letter grades.
Limited enrollment. Fall, R. A. Green;
spring, R. A. Schnur.

A basic course designed to develop understanding of tax concepts and ability to work effectively with the Internal Revenue Code, regulations, cases, and other tax materials.

LAW 6461 Financial Institutions

Spring. 4 credits. S-U or letter grades.
R. C. Hockett.

An introduction to the regulatory structures, as well as some of the economic, technological and other factors, that pattern the conduct of financial intermediation in the U.S. The principal focus will be upon commercial banks, investment companies (mainly mutual funds), insurance companies, pension funds and securities firms in so far as these institutions discharge a common set of economic functions and give rise to a common cluster of counterparty and third party ("systemic") risks. Legal topics to be covered accordingly include entry-, functional and geographical restrictions; consumer-protection (including disclosure requirements) and competition-promotion; capital adequacy-, solvency- and related forms of risk-regulation (including deposit insurance); community-reinvestment; and "self-regulation."

We shall also devote some attention to "alternative" financial service providers such as check-cashing services, community development financial institutions and micro-credit providers; and we shall take occasional note both of divergent (generally, non-American) jurisdictions' dominant modes of financial intermediation and of the "globalization" of finance, in order both to place what is distinctive about the dominant American forms into bolder relief and better to understand the forces operating behind recent and still unfolding changes to the American (and global) financial and finance-regulatory environments. No prior background in financial law or economics is required, but it is helpful.

LAW 6471 Health Law

Fall. 3 credits. S-U or letter grades.
H. R. Beresford.

This course will consider legal aspects of the organization, financing, and distribution of health care in the United States. It will emphasize issues of access, costs, and quality, and address the use of regulation, litigation and market-driven strategies to confront emerging problems. Readings will be from a health law casebook, supplemented by occasional handouts of current materials. The goal is to convey an appreciation of the challenges involved in providing health care to those in need and of the role of law and lawyers in meeting these challenges.

LAW 6501 Insurance Law

Spring. 3 credits. S-U or letter grades.
M. Heise.

Insurance is an increasingly important tool for the management of risk by both private and public enterprises. This course provides a working knowledge of basic insurance law governing insurance contract formation, insurance regulation, property, life, health, disability, and liability insurance and claims processes. The emphasis throughout the course is on the links between insurance theory, doctrine, and modern ideas about the functions of private law.

LAW 6511 Intellectual Property

Fall. 3 credits. Letter grades or S-U by permission of the faculty member.
O. Liivak.

A survey of legal mechanisms for protecting intellectual property including patent, trademark, copyright, trade secret, and related state law doctrines.

LAW 6521 International Business Transactions

Fall. 2 credits. S-U or letter grades.
D. MacGrath.

This course provides an overview of different commercial legal systems and examines private and public law aspects of international business transactions and the legal rules governing such transactions. Examples of private international business transactions include international sale of goods, letters of credit, foreign investment, international technology transfers and joint ventures. This course also considers international dispute resolution mechanisms (including international litigation and commercial arbitration) and related issues (including governing law, choice of forum and applicable treaties).

LAW 6531 International Commercial Arbitration

Fall. 3 credits. S-U or letter grades.
Students who have taken the international commercial arbitration course in the Paris

program will receive 1 credit for this course. All others will receive 3 credits.

J. J. Barceló III.

A study of arbitration as increasingly the dispute resolution method of choice for international trade and international business disputes (where the parties are from different countries). The course introduces the sources and hierarchy of norms governing international arbitration and then studies the legal issues and processes concerning enforcement of agreements to arbitrate, selecting and challenging arbitrators, choosing the procedure and applicable law in arbitral proceedings, and enforcement of the resulting arbitral award. The course gives special attention to the 1958 UN Convention on the Recognition and Enforcement of Foreign Arbitral Awards (and agreements to arbitrate) known as the New York Convention, and the UNCITRAL (U.N. Commission of International Trade Law) Model Law. The course's unique approach—patterned on the nature of international commercial arbitration itself—focuses on commercial arbitration as a transnational phenomenon and not on arbitration under any particular national system. The course materials include court decisions, arbitral awards, national arbitration statutes, the rules of various arbitration institutions, and scholarly writings—drawn from all over the world.

LAW 6532 International Law and Politics

Spring. 3 credits. S-U or letter grades.
A. Efrat.

The course is an introduction to public international law from a social science perspective. We begin by exploring the basic principles of international law, such as treaty making and sovereignty. We then cover the laws of war, international trade law, international law and development, human rights law, international law in the U.S. legal system, and legalized resolution of international disputes. The course will emphasize the close relationship between international law and politics and will seek to answer questions such as: Why do states comply with international law? Why do states sometimes turn to an international court to settle their disputes? How and to what extent has international law been effective in facilitating trade and promoting human rights? Throughout the course, we will consider relevant historical and contemporary episodes, such as the use of force in Iraq and the development of the World Trade Organization.

LAW 6681 International Law and Foreign Direct Investment

Spring. 3 credits. S-U or letter grades.
M. B. Ndulo.

This course studies legal aspects of direct foreign investments. It seeks to identify legal problems that are likely to affect a commercial investment in a foreign country. Inter alia, it deals with the public international law principles and rules governing the establishment by foreign businesses of various factors of production (persons and capital) on the territory of other states and the protection of such investments. Thus, the course includes a discussion of the following topics: economic development and foreign capital; obstacles to the flow of investments to developing countries; guarantees to investors and investment codes; bilateral treaties; nationalization; joint ventures; project financing; transfer of technology; arbitration;

investment insurance; unification of trade law; and the settlement of investment disputes.

LAW 6583 International Trade and Development

Fall. 3 credits. S-U or letter grades.
C. Thomas.

This course focuses on the intersection of two key objectives of the international order and international economic law: (1) the promotion of rules for the stabilization and liberalization of international trade; and (2) the encouragement of economic growth and development in poor countries. The course will begin with an overview of theoretical and policy models for development through trade, and then consider the origins and commitments of existing international trade law. Employing a case-study approach, the course will proceed to examine high-profile international trade disputes implicating development issues. Questions arising out of these disputes include the following: Should developing countries receive special and differential trade preferences or be subject to universal free trade principles? Speaking of universal principles, should developing country governments be subject to the same environmental and labor standards that apply in industrialized countries? What about intellectual property rights do they help or hinder economic growth in weak economies? And how does trade affect the debt burdens of poor countries? Finally, what do these issues, and the disputes that raised them, suggest about the chances for success of current efforts in the international trade regime, such as the stalemated Doha Development Agenda?

LAW 6590 Judicial Opinion Writing

Fall. 3 credits. S-U or letter grades.
J. Mollenkamp.

Judicial opinions are a fundamental part of our legal system. Well-written opinions share many common characteristics making them effective resolutions of current disputes as well as helpful precedent for the resolution of future disputes. This course will require students to research, write, and revise majority and dissenting opinions in various cases based upon a careful consideration of a full record, an oral argument, and any applicable precedent.

LAW 6592 Labor Law, Practice and Policy

Fall. 3 credits. S-U or letter grades.
A. B. Cornell.

This course will focus on the federal laws regulating the organization of private-sector workers and unions and the process of collective bargaining in addition to addressing protected concerted activity unrelated to union organizing. Practice in the field of labor and employment law will be highlighted along with important and timely public policy issues.

LAW 6601 Land Use Planning

Fall. 3 credits. S-U or letter grades.
E. Penalver.

This course will provide a broad introduction to the theory, doctrine, and history of land use regulation. Topics will include zoning, homeowners' associations, nuisance, suburban sprawl, eminent domain and regulatory takings. Readings will be drawn from the leading cases as well as commentary by scholars in the fields of law, architecture, and planning.

LAW 6141 Law and Ethics of Business Practice

Fall. 2 credits. S-U grades only.
S. J. Schwab.

Each week a distinguished guest lecturer from the business world will present a business-law problem. Speakers include the founders of businesses, the managing partners of large law firms, and the managers of hedge funds and private equity firms. The problems will cover a wide variety of topics, such as how to comply with the Sarbanes-Oxley audit requirements and how a hedge fund should react to improperly discovered confidential information. Students will be required to write two 5-page lead papers on particular problems, and four 2-3 page response papers on themes covered in the class. No final examination.

LAW 6631 Law for High Growth Business (also NBA 6890)

Fall. 3 credits. S-U or letter grades. BR
Legal students must preregister to receive first priority for the course. Limited enrollment. Z. J. Shulman.

An in-depth analysis of key issues that an emerging high growth business must consider and address, including: (i) choosing type of business entity, (ii) protecting confidential information and inventions, (iii) sources of capital, (iv) understanding capitalization structures (common stock, preferred stock, warrants, etc.), (v) use of stock options as employee incentives, (vi) fundamental employment practices, (vii) proper establishment and utilization of Boards of Directors and Advisory Boards, (viii) technology licensing and commercialization, and (ix) acceptable business practices and the Foreign Corrupt Practices Act.

LAW 6641 The Law Governing Lawyers

Spring. 3 credits. Letter grades only.
Satisfies professional responsibility requirement. Enrolling in this course does not prohibit enrollment in another professional responsibility course.
W. B. Wendel.

This course is intended to provide a comprehensive overview of the law governing lawyers in a variety of practice settings, including transactional, counseling, and civil and criminal litigation. The course is not focused merely on the ABA's Model Rules, but draws extensively from judicial decisions in malpractice and disqualification cases, the new Restatement of the Law Governing Lawyers, and other sources of law. A major theme is the relationship between state bar disciplinary rules and the generally applicable law of tort, contracts, agency, procedure, and crimes. Another significant theme is the prevention of attorney discipline and malpractice liability through advance planning.

LAW 6651 The Law of Branding and Advertising: Trademarks, Trade Dress, and Unfair Competition

Fall. 2 credits. S-U or letter grades.
N. St. Landau.

Fundamental trademark, trade dress, and false advertising laws are examined in the context of assisting clients to execute branding and marketing strategies. Special focus is given to branding as it relates to: "consumer products companies"; the impact of e-business and the Internet on branding strategies and acquisitions; and complex proof issues in trademark and domain name litigation. Marketing strategies embody fundamental and long-established principles of the trademark laws. The Lanham

Act is used to address issues ranging from confusingly similar words and designs, to false and unsubstantiated advertising claims, and public appropriation—and misappropriation—of long-established corporate icons in today's e-commerce world. This course examines the basics of this rapidly changing body of law.

LAW 6701 Legislation

Spring. 3 credits. S-U or letter grades.
J. Chafetz.

Much of the "law" that lawyers work with is statutory. This course will examine both how legislatures go about doing their work (that is, legislative process) and how courts and others utilize legislative output (that is, statutory interpretation). We will begin with a case study of the drafting and judicial interpretation of the 1964 Civil Rights Act. We will then devote substantial attention to theoretical and practical issues in statutory interpretation, including theories of interpretation generally, the canons of construction, and the use of legislative history. We will also examine the rules governing legislative behavior and debate, and we will consider how the different roles of legislators and judges affect our interpretation of statutes and cases.

LAW 6742 Patent Law

Spring. 3 credits. Letter grades or S-U by permission of the faculty member only.
Prerequisite: An intellectual property survey course such as LAW 6511 is recommended but not required. O. Liivak.

This course will focus on U.S. patent law giving comprehensive coverage of doctrinal elements and touching on key policy issues. No technical background is required.

LAW 6713 Prelude to the U.S. Supreme Court and Labor and Employment Law

Winter. 1 credit. S-U grades only. Please note that this course may require students to miss at least one day of class during the semester for travel. Class is limited to 6 students with preference given to third-year students. The course will meet for two hours at the end of the fall examination period. Prior to the start of spring semester, during the second week in January, the class will meet for two four-hour days. This period will be spent discussing the substantive law in the case and hearing student presentations. The discussion of the case will continue on the six-hour drive to D.C. and debriefing on the return leg of the trip. Students will have one class session in spring with professors who have clerked in the Supreme Court. During the intercession period, students will be required to communicate with the professor regarding their paper topics and research agendas. A. Cornell.

This 1-credit intercession course will expose students to a timely labor and employment law topic pending before the U.S. Supreme Court. The class will travel to D.C. sometime during the semester in order to hear the oral argument. During the intercession period, students will be required to read the briefs in the case, prepare a five-page paper on a related topic, and to present their research in class. Over the break, students will be required to read *The Nine: Inside the Secret World of the Supreme Court*, by Jeffrey Toobin or another book about the Court agreed upon by the professor. A one-page review of the book will also be required. Additional reading may be assigned.

LAW 6781 Products Liability

Fall. 3 credits. Letter grades only.
J. A. Henderson Jr.

Applications of products-liability doctrine and theory to a variety of problems drawn from or closely approximating actual litigation. An overview of the relevant case law, statutes, and administrative regulations, including the Restatement, Third, of Torts: Products Liability.

LAW 6791 Public International Law

Fall. 3 credits. S–U or letter grades.
J. Ohlin.

An introduction to the legal rules governing the conduct of states vis-à-vis other states, individuals, and international organizations, with reference to major current events and issues. Topics include the nature, sources, and effectiveness of international law; the establishment and recognition of states; principles concerning state sovereignty, territory, and jurisdiction; the law of treaties; state responsibility; international criminal and humanitarian law; terrorism; and human rights. Special attention is given to the law governing the use of force.

LAW 6792 Real Estate Transactions and Deal Structuring (also CRP 6290)

Spring. 3 credits. S–U or letter grades.
D. L. Funk.

Real estate transactions and deal structuring will examine real estate deals through a practitioner perspective within a case study and transactional approach. The course looks at the transactional components and structuring of real estate deals and related parties at each step in creating value from real estate, including acquisition and assemblage; due diligence; sourcing and financing; structuring the venture/parties; operation; disposition; and tax consequences. Additional issues within deal structuring that may be included are negotiation, managing risk including litigation and environmental issues, and analysis of financing techniques, and consequences when deals go bad, including workouts and bankruptcy. The case study format will address deals from the perspectives of investment fund manager, banker/lender, developer, REIT, joint venture partner/investor, and owner. The course will include assignments and exercises where students analyze real estate transactions, prepare and negotiate documents, and present transactions and deals to review entities.

LAW 6811 Secured Transactions

Spring. 3 credits. S–U or letter grades.
N. Oman.

A study of Article 9 of the Uniform Commercial Code, the law regarding security interests in personal property. In a secured transaction, a creditor may resort directly to particular assets of the debtor if an obligation is not met. The assets may be virtually any property, whether tangible (e.g., inventory and equipment) or intangible (e.g., shares of stock, accounts, intellectual property). Secured transactions are an integral part of the complex world of commercial finance. They help fuel the economy by enabling debtors to borrow more freely and lenders to better manage risk. On the other hand, if a debtor becomes insolvent, there might be nothing left for other creditors or tort victims because Article 9 enables lenders who take security to claim virtually all the debtor's assets. The first goal of the course is for students to become familiar with the substantive law, and particularly to learn to recognize when Article

9 applies to a transaction, which may not be immediately apparent. Second, working through the intricacies of Article 9 will help students sharpen their skills in statutory interpretation. Finally, we will address some of the theoretical issues involved in security and debt. There is no prerequisite for this course. (Students with a particular interest in commercial law may wish to study bankruptcy as well as secured transactions, but this can be done in either order.)

LAW 6821 Securities Regulation

Spring. 4 credits. S–U or letter grades.
Prerequisite: Corporations/Business Organizations (or the equivalent for LL.M.s) is required for a student to enroll. This requirement may be waived only with the permission of instructor. A student may enroll in Corporations/Business Organizations concurrently. C. K. Whitehead.

This course analyzes key issues under the U.S. federal securities laws, principally the Securities Act of 1933 and the Securities Exchange Act of 1934, with respect to the domestic and international offer and sale of securities. It includes a study of what constitutes a security, the public offering process, mandatory disclosure requirements for public companies, exemptions from registration (including exempt global offerings), and potential liabilities and sanctions.

LAW 6823 Social and Cognitive Psychology for Lawyers

Spring. 3 credits. Letter grades only.
J. J. Rachlinski. Limited enrollment.

In their short history, cognitive and social psychology have produced a rich understanding of how human beings think and how they interact with each other. It should therefore come as no surprise that these two fields have a number of applications to law. This course will explore those applications. Examples include: what effect common errors in judgment have on tort and contract law; how the perception of risk affects societal demand for regulation in environmental law; how organizational and group decision-making processes affect corporate governance; how social norms about fairness impede or facilitate negotiation and dispute resolution; how biases in judgment influence litigation strategies; and what studies of conformity mean for the development of international human rights law. The goal of this course is to introduce students with interests in different areas of law to some general principles of human thought and social interaction that will be valuable to them in their future practice.

LAW 6822 Social Science and the Law

Fall. 3 credits. S–U or letter grades.
V. Hans.

This course examines the relationship of social science to law, focusing on the growing use of social science in the legal system. Over the past several decades, increasing numbers of social scientists have conducted systematic research on the operation of law and legal institutions. At the same time, social scientists themselves are testifying as experts in increasing numbers, encouraging lawyers and judges at both the trial and appellate levels to rely on social science evidence to decide cases. Social science research is also used as a tool in law reform. The aim of the course is to develop a critical analysis of these uses of

social science in law and litigation. Are social scientists asking the right questions? Are lawyers, judges, legislators, and legal reformers using social science findings appropriately? Is the law's increasing reliance on social science problematic or advantageous—or both?

LAW 6841 Sports Law

Spring. 2 credits. Recommended prerequisites: Antitrust Law and Labor Law. Course meets for 10 weeks. S–U or letter grades. W. B. Briggs.

The course traces the development of sports law in the United States. Particular attention is given to the relationship of sports with antitrust and labor law. Contemporary issues involving arbitration, collective bargaining, amateur athletics, agents, franchise movement, and constitutional law are addressed.

LAW 6844 State and Local Government

Fall. 3 credits. S–U or letter grades.
L. S. Underkuffler.

State and local governments have long been regarded as “laboratories” for possible solutions to difficult social issues, and as political institutions that are closest to the people. In addition to traditional concerns, state and local governments in recent years have been the primary actors in contentious areas such as health care reform, gay marriage legalization, campaign finance reform, property rights protection, and other issues. This course will examine the powers of and legal restraints on state and local governments in state systems, and as a part of the American constitutional order. Topics will include state constitutions, the rights that they confer, and their methods of interpretation; local government boundary formation and boundary change; state and local service, police, and taxing powers; the emergence of supra-local (regional) government; and the place of state and local governments in the federal system (including commerce clause, privileges and immunities clause, and taxation issues). The final part of the course will consider several areas of recent and future litigation—such as the interstate validity of gay marriages and federal challenges to states' medical and health reforms – as a way to illustrate the difficult issues of conflicting sovereignty that this area of law presents.

LAW 6861 Supervised Teaching

Fall, spring. 1 or 2 credits. S–U grades only. Arrange directly with instructor. Specific credit limits apply—carefully review the registration form available from online registration site or registrar's office.

LAW 6871 Supervised Writing

Fall, spring. 1, 2, or 3 credits. S–U grades only. Arrange directly with instructor. Specific credit limits apply—carefully review the registration form available from online registration site or registrar's office.

LAW 6881 Supervised Teaching and Supervised Writing—Lawyering Program Honors Fellows

Full year. 4 credits. S–U grades only. Prerequisite: application process. Specific credit limits apply—carefully review the registration form available from online registration site or registrar's office.

Lawyering Program Honors Fellows serve for the full academic year as teaching assistants in the Lawyering course. With training and guidance from the Lawyering faculty, Honors Fellows work on myriad course-related tasks. In addition to meeting regularly with first-year

students, Honors Fellows may help design course assignments and documents, critique papers, participate in simulations, and assist the research attorneys with the teaching of legal research. Honors Fellows also teach classes on the Bluebook. Additionally, Honors Fellows serve as mentors to first-year students and may participate in workshops on basic law-school skills. During the spring semester, Honors Fellows may, under the direction of the Dean of Students, tutor first-year students.

LAW 6891 Taxation of Corporations and Shareholders

Spring. 3 credits. S-U or letter grades.
Prerequisite: Federal Income Taxation.

LL.M. students must secure permission of instructor. R. A. Green.

This course examines the federal income taxation of corporate transactions, including incorporations, dividends, redemptions, liquidations, and reorganizations.

LAW 6892 Negotiated and Collaborative Decision-Making

Spring. 3 credits. Letter grades only.
Limited enrollment. C. R. Farina,
M. J. Newhart.

Increasingly, systematic and collaborative techniques are being used both to address conflict and to reach decision in diverse settings, including the workplace, communities, and government. This course focuses on the nature of conflict; personal, cognitive and cultural factors affecting collaboration and negotiation; systems for conflict management, and different orientations for negotiation, mediation, and facilitation. Private and public settings will be considered; emerging online processes will be discussed. Case studies and exercises will be used to develop critical thinking and reasoning abilities, and illustrate the collaborative, creative and response methods for resolving disputes.

LAW 6921 Trial Advocacy

Spring. 4 credits. S-U or letter grades. Pre- or co-requisite: Evidence. G. G. Galbreath.
Limited enrollment.

The course is devoted to the study and weekly performance of the full range of trial techniques. Fundamental skills are taught in the context of challenging procedural and substantive law problems. Each stage of the trial is examined: jury selection, opening statement, direct examination, cross-examination, objections, impeachment, exhibits, expert witnesses, child witnesses, pre-trial, and closing argument. In addition to a lecture and student exercises every week, students will do a full day jury trial exercise at the completion of the course on a weekend at a local court with an actual judge and jury. All weekly performances are digitally recorded and reviewed and then re-reviewed by another faculty member with the student individually. There are occasional written assignments and class attendance is mandatory for all exercises sessions and the first class lecture. The pass/fail option is available.

LAW 6941 Trusts and Estates

Fall. 4 credits. Letter grades only.
G. S. Alexander.

The course surveys the law of succession to property, including wills and intestate succession, as well as the law of trusts. The course provides basic tools for estate planning, but does not include systematic coverage of estate taxation.

LAW 6981 WTO and International Trade Law

Spring. 3 credits. S-U or letter grades.

J. J. Barceló III.

The law of the World Trade Organization (WTO), including international trade theory, the basic WTO rules and principles limiting national trade policy, and the WTO dispute settlement process. A study of national (U.S.) fair and unfair trade law within the WTO framework (safeguard, antidumping, subsidies and countervailing duty remedies).

Consideration will also be given to non-trade values within the WTO system (environment, labor rights, and human rights).

PROBLEM COURSES AND SEMINARS

All problem courses and seminars satisfy the writing requirement. Limited enrollment.

Admission to all problem courses and seminars determined by lottery.

LAW 7012 Advanced Criminal Procedure: Post-Conviction Remedies

Spring. 3 credits. S-U or letter grades.

Limited enrollment. Satisfies writing requirement. K. M. Weyble.

This course examines the procedural and substantive law governing collateral challenges to criminal convictions in state and federal courts, and explores the tensions between the criminal justice system's competing interests in finality and production of reliable convictions and sentences. The course includes a historical overview of modern habeas corpus, studies substantive claims for relief common to collateral proceedings, and examines important procedural limitations on relief including the exhaustion requirement, procedural default, and nonretroactivity. Much of the course will concentrate on the meaning, application and impact of the modifications to the federal habeas corpus statutes made by the Antiterrorism and Effective Death Penalty Act of 1996.

LAW 7031 Advanced Legal Research

Spring. 3 credits. Letter grades only.

Prerequisite: Lawyering. Limited enrollment. Satisfies writing requirement.

P. G. Court, J. M. Callihan, and A. Emerson.

This seminar is designed to provide students with research skills that are essential for success as law practitioners, regardless of their career path. The topics move beyond the basic legal research instruction in Lawyering, including efficient use of Lexis, Westlaw, and other electronic databases; internet resources; international and foreign law research; business and social science resources; and legislative history. Emphasis is placed on devising effective research strategies, finding materials, and evaluating resources. In addition to weekly assignments on each topic, students develop their skills by completing a substantial paper examining the research process and key sources in a topic of the student's choosing.

LAW 7042 Advanced Litigation: Problem-Solving Seminar

Spring. 3 credits. S-U or letter grades.

Limited enrollment. Satisfies writing requirement. Attendance is not mandatory for first class, although strongly recommended. M. Oxhorn.

Through a series of written and oral assignments involving hypothetical federal and state cases (criminal as well as civil) derived

from the instructor's actual experience as a litigator, students will learn reliable methods for developing effective responses to a wide range of increasingly complex litigation problems, including ones involving seemingly novel questions or unfamiliar fields. There will be some opportunities for formal drafting, briefing and moot court presentations, but the primary focus will be on working through a series of problem-solving exercises designed to enable any good advocate to approach even the most challenging issues with the clarity and creativity needed to (a) identify what is at stake and (b) successfully anticipate and be prepared to respond to any potentially persuasive arguments that an adversary or court might conceivably raise. There will be no examinations. Grading will be based entirely on student work on assignments and class participation, including an overall assessment of progress over time.

LAW 7052 Advanced Persuasive Writing and Appellate Advocacy

Fall. 3 credits. S-U or letter grades.

B. R. Bryan. Limited enrollment. Satisfies writing requirement.

Students will master the art of persuasive writing and oral advocacy. Lecture topics include: knowing your audience; writing a Statement of Facts that appears objective but subjectively persuades; what good judges are taught about good writing; methods to achieve clarity, brevity and logic; issue selection; the effective use of precedent; establishing credibility; understanding non-legal factors that influence decisions; the interplay between judges and their law clerks; appellate procedure and standards of review; the winning opening statement; and handling questions from the bench. Students will critique actual briefs, judicial opinions and oral arguments for technique and persuasive value. Guest speakers, including judges of the United States Court of Appeals for the Second Circuit and federal prosecutors, will provide advice and recommendations. Students will apply what they have learned to the drafting of an appellate brief based on an actual court record. The brief will be written in stages and followed by one-on-one critiques. Student will also present an oral argument. Initial practice arguments are critiqued by the professor and student panels (to permit students to see an argument from a judge's perspective), and the final argument is judged by the professor.

LAW 7022 Advanced Topics in Property Theory

Spring. 3 credits. Letter grades only.

Limited enrollment. Satisfies writing requirement. L. Underkuffler.

The idea of property as that which describes the individual's inviolable sphere has been central to our constitutional scheme and to calls for protection of various interests by the political right and the political left. In this seminar, we will examine the idea of property and its usefulness in resolving issues of current social conflict. We will begin with a general consideration of rights by examining some philosophical readings on rights theories, and critiques of those theories. We will next look at the particular right of property: what it is, and the extent to which it should be placed beyond ordinary democratic processes through various constitutional theories of protection. We will then consider the extent to which property concepts can be usefully employed to resolve an array of critical social issues, such as the enforcement

of surrogacy (parenting) contacts, the sale or other control of body parts, the determination of the fate of human embryos, the pursuit of human cloning and genetic engineering, an individual's control of personal information, the recognition of relational rights (such as those arising from unmarried heterosexual and gay relationships), and others. Grading will be based on brief reaction papers written by students throughout the course. Students who wish to write longer research papers in conjunction with the seminar may do so for additional credit (with permission of instructor).

LAW 7072 Animal Rights

Spring. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. S. F. Colb.

This seminar examines the moral assumptions underlying the legal status and human use of non-human animals. State and federal law treat animals primarily as property, sometimes modified to take account of animals' subjective experience. We will study a variety of legal and philosophical writings that address the legal and moral status of animals, including the debate between supporters of an "animal welfare" approach that aspires to the reduction of animal suffering, and supporters of an "animal rights" approach that aims to abolish the use of animals. Among the questions the seminar poses are: What capacities, if any, warrant shielding animals from various forms of exploitation? Do animals have interests in continued existence or merely in avoiding suffering? Might some but not other human uses of animals be justified, and if so, which ones? Medical experimentation? The use of animal products (such as milk and eggs) for food? The keeping of animals as pets? In addition to the assigned readings, students will be responsible for a research paper.

LAW 7091 Biblical Law

Spring. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. C. M. Carmichael.

Analysis of law and narrative in the Bible from the perspective of ancient law and legal history. Topics include the nature of the law codes (e.g., hypothetical formulation versus statutory law), legal issues in the narratives (e.g., law of adultery and women's rights), law and morality (e.g., the Ten Commandments), law and religion (e.g., institutions guaranteed by the law but condemned by religious authority), the transformation of extralegal relations into legal ones (e.g., with the introduction of money), legal interpretation in antiquity (e.g., the Sermon on the Mount), social factors in legal development (e.g., shame and guilt), and aspects of criminal, family, and private law (e.g., an eye for an eye, incest rules, and unjust enrichment).

LAW 7102 Capital Punishment Law

Fall. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. C. Seeds.

This seminar examines the complex body of law governing imposition of the death penalty in the United States. The course aims to provide a historical overview of capital punishment law, critically analyze its constitutional doctrines, and introduce aspects of criminal procedure that are unique to death penalty cases. The primary focus will be on Eighth Amendment jurisprudence, including challenges to the arbitrary and discriminatory

application of the death penalty, the development of modern death penalty statutes, the role of aggravating and mitigating circumstances in the capital sentencing trial, and constitutional limitations on eligibility for the death penalty. The course will also examine the performance standards for counsel in capital cases, difficult problems raised by volunteer defendants who wish to waive mitigation, the role of international law in capital cases, and the constitutionality of certain methods of execution. The seminar is recommended for students interested in the Capital Trial Clinic or the Capital Appellate Clinic.

LAW 7092 Catholic Thought and the Law

Fall. 3 credits. S-U or letter grades. E. Penalver. Limited enrollment. Satisfies writing requirement.

With a Catholic majority on the Supreme Court, it is more important than ever to understand the distinctive features of the Catholic jurisprudential tradition. This course is intended to serve as a broad introduction to Catholic social teaching as it has developed since the Pope Leo XIII's landmark 1891 encyclical, *Rerum Novarum*. The course involves a mixture of readings, ranging from church documents to scholarly commentary by such writers as Thomas Aquinas, John Courtney Murray, Robert George, and Charles Curran. Issues covered include the relationship between morality and law, economic justice and the welfare state, the Theology of Liberation, the death penalty, abortion, and assisted suicide.

LAW 7101 Central Topics in Jurisprudence and Legal Theory

Fall. 3 credits. Letter grades only. Limited enrollment. Satisfies writing requirement. R. S. Summers.

This seminar will address four related topics that arise within all discrete law school courses: (1) the rational design of overall forms and complementary material or other components of the main functional legal units of a system of law, including those that are institutional such as legislatures and courts, preceptual such as rules and principles, and enforceive such as sanctions and remedies, (2) the distinctive bearing of various concepts of justice on the make-up and operation of functional legal units and other phenomena of law, with several sessions on procedural justice, (3) the special and extensive nature of the resources of reason and argument in the law, and (4) the major facets of the "legal positivism vs. natural law" debate. In a discrete law school course, many occasions arise to give such topics as the foregoing some frontal and systematic treatment, yet many instructors feel there is rarely time to stop and do so without sacrificing important course coverage. The well-educated lawyer should, however, be conversant with such topics as the foregoing, and with at least some of the now very rich literature of relevance. A special seminar or course is one solution.

Assigned seminar materials will include a recent book by Prof. Summers, *Form and Function in a Legal System* (Cambridge University Press), selected jurisprudential readings, judicial opinions, statutes, and other primary sources. There will be extensive opportunity for seminar discussion. The grade will be based on a seminar paper and class discussion.

LAW 7144 Colloquium on Law and Development in the Middle East and North Africa

Spring. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. C. Thomas.

This course begins with a comparative review of contemporary approaches to law and development, from the era of 20th-century decolonization to the present day. We will then consider particular challenges in the region related to conflict resolution, democratic governance, urbanization, and market growth. The bulk of the course will feature speakers from Cornell as well as other universities who will present their work for critical analysis by the class. Students will be required to write six short papers, which will be due in advance of the class session.

LAW 7151 Constitutional Law and Political Theory

Spring. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. S. H. Shiffrin.

The purpose of the seminar is to explore theories of freedom of speech and theories of equality. How are the ideas of freedom, equality, association, and community linked in doctrine, and how should they be linked? Neoconservative, liberal, radical, feminist, and Marxist writings may be considered.

LAW 7132 Constitutional Law and Theory Colloquium

Fall. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. J. Chafetz and M. Dorf.

This colloquium will examine current and classic topics in advanced constitutional law and constitutional theory. Roughly half of the sessions will feature presentations of works in progress by constitutional scholars. During the other sessions, assigned readings will mostly consist of canonical works in the field. For class meetings in which no faculty presentation occurs, responsibility for presenting the assigned reading will rotate among students in the colloquium. Over the course of the term, each student will be responsible for writing three brief reaction papers to the works in progress and at the end of the semester, each student will hand in a longer research paper on a topic approved by the instructors.

LAW 7991 Cornell Research Colloquium

Fall. 3 credits. Limited enrollment. Satisfies writing requirement. Required for all first-year J.S.D. candidates. J.S.D. and LL.M. program grading—H, S, U. J.D. program—Letter grades only. Open first to LL.M. students and then to J.D. students to the extent that places are available. Visiting scholars and exchange students from foreign institutions are highly encouraged to attend in an unofficial capacity. M. Lasser.

This seminar is a course in advanced academic research methodology. The Colloquium is designed to prepare the students to engage in doctoral-level research, analysis and writing, especially in comparative and international contexts. How is the researcher to select an object or subject of investigation? How should she formulate research questions? How should she engage in the study of foreign and domestic legal institutions, doctrines and/or cultures? How is interdisciplinary work to be accomplished? The early portions of the course will involve

discussing readings in comparative research methodology, including functionalism, Common Core analysis, legal transplant theory, historicism, law and development, legal pluralism, cultural analysis, colonial studies, and comparative institutionalism. In the latter portions of the course, students will present and critique their methodologically reflective research projects. A modest number of external speakers will be invited to present their work in progress for the purposes of generating methodologically oriented discussion.

LAW 7171 Corruption Control

Spring. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. R. Goldstock.

This seminar analyzes the types of corruption that exist in both the public and private sectors, the means by which a variety of criminal and non-traditional remedies may be used to reduce the frequency and impact of corrupt activities, and the constitutional and statutory problems implicated by such approaches.

LAW 7170 East Asian Law and Culture Seminar

Fall. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. Cannot be taken concurrently with LAW 7171. A. Riles.

With many of the world's most dynamic economies now in East Asia, today's law graduates are more likely than ever to be involved with legal issues from that region. At the same time, legal problems in East Asia, from human rights, to judicial and legal education reform, to conflicts over labor, environmental and minority rights, to local debates about medical and scientific regulation and ethics, are invaluable sources of comparative insight about our own legal system. This seminar introduces students to the challenges and opportunities of studying law and culture in East Asia from a sophisticated interdisciplinary perspective. Students will participate in a semester-long colloquium and conference series on law and culture in East Asia in which Cornell faculty and guest speakers from around the world will present new research on current legal issues in the region. Students will be required to read a series of background materials in preparation for each seminar and to write six three- to five-page papers responding to the presentations. Everyone who wishes to take the course for credit must attend the first class. With the permission of instructor a student will be permitted to take this seminar more than once.

LAW 7171 East Asian Law and Culture Colloquium

Fall. 1 credit. S-U grades only. Unlimited enrollment. Cannot be taken concurrently with LAW 7170. A. Riles.

Students will participate in a semester-long colloquium and conference series on law and culture in East Asia in which Cornell faculty and guest speakers from around the world will present new research on current legal issues in the region. Attendance and participation in all of the six to eight scheduled colloquia as well as the annual Clarke Lecture and Conference is required. Students will prepare a three- to five-page response paper summarizing key findings of one workshop event for a wider public audience over the course of the semester.

LAW 7194 Empirical Legal Studies Colloquium

Spring. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. V. Hans.

This colloquium provides an in-depth exploration of Empirical Legal Studies, which involves the application of systematic research methods to the study of legal issues. Issues that have been studied using these methods include such diverse topics as the structure of the legal profession, the influence of race and gender in legal decision making, the impact of educational policies and practices, reforms in medical malpractice and civil justice, corporate law and finance, bankruptcy, employment discrimination, and criminal sentencing.

LAW 7201 Empirical Studies of the Legal System

Fall. 3 credits. Letter grades only. Limited enrollment. Satisfies writing requirement. T. Eisenberg.

This seminar will focus on empirical studies of selected topics, including the death penalty and punitive damages. Each student is expected to complete an empirical project. Each student will need a laptop computer.

LAW 7172 Employment Discrimination

Fall. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. M. L. Goldstein.

This seminar explores contemporary problems in employment discrimination law. It focuses on legal issues involving Title VII, wrongful discharge, disability discrimination, age discrimination, and equal pay. Students are required to submit a paper as partial fulfillment of the requirements of the course.

LAW 7232 Ethical Issues in the Investigation and Prosecution of Complex Criminal Cases and Terrorism

Fall. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. Satisfies professional responsibility requirement. M. Bachrach.

This seminar will explore the role of government lawyers and defense counsel in complex investigations and prosecutions, including cases and matters involving terrorism. We will examine some recent cases and proceedings, including, for example: the disbarment of Michael Nifong, the prosecutor of the Duke Lacrosse team members; the Scrusby and Stringer cases; the Chapman case; and recent cases against two criminal defense attorneys, Lynne Stewart and Robert Simels. We will also address the role of government lawyers in advising on the treatment of detained persons during interrogation. In doing so, we will read some of the materials, including recently declassified memoranda, written by and about lawyers from the Office of Legal Counsel of the Department of Justice on the use of cruelty and torture in the investigations conducted as part of the war on terrorism.

LAW 7261 Feminist Jurisprudence

Spring. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. C. G. Bowman.

This seminar examines the role of law, and more generally, the role of the state, in perpetuating and remedying inequities against women. After studying the historical emergence of sexual equality law in the United States, we will discuss a number of paradigmatic feminist legal theories, including formal equality, MacKinnon's "dominance" theory, relational feminism, pragmatic

feminism, and various anti-essentialist theories (e.g., critical race feminism and intersectionality). We will then proceed to apply these analytical structures to various substantive areas of law of particular concern to women, including but not limited to rape and other types of violence against women; abortion, surrogacy and other reproductive rights issues; pornography; prostitution; and problems encountered by women in the legal profession.

LAW 7291 Global and Regional Economic Integration: The WTO, EU, and NAFTA

Spring. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. J. J. Barceló III.

The seminar studies the process of international economic integration occurring both globally and regionally. In the global context it takes up a basic introduction to WTO law and selected problems. In the regional context it takes up a basic introduction to the European Union, including the institutional and lawmaking processes, the direct effect and supremacy of EU law, and the development of the four freedoms (goods, services, persons, and capital). A basic introduction to NAFTA will also be included. Student seminar papers may deal with issues arising within any of the three regimes. Comparative studies will be encouraged.

LAW 7311 Immigration and Refugee Law

Fall. 3 credits. S-U or letter grades. Prerequisite: Constitutional Law. Limited enrollment. Satisfies writing requirement. S. W. Yale-Loehr.

This course explores the evolving relationship between U.S. immigration policy and our national purposes. Immigration plays a central role in contemporary American life, significantly affecting our foreign relations, human rights posture, ethnic group relations, labor market conditions, welfare programs, public services, and domestic politics. It also raises in acute form some of the most basic problems that our legal system must address, including the rights of insular minorities, the concepts of nationhood and sovereignty, fair treatment of competing claimants for scarce resources, the imperatives of mass administrative justice, and pervasive discrimination. In approaching these questions, the course draws on diverse historical, judicial, administrative, and policy materials.

LAW 7593 Income Taxations of Corporate Mergers and Acquisitions

Spring. 3 credits. S-U or letter grades. Prerequisite: Federal Income Taxation is an absolute prerequisite for the seminar, unless (a) a student believes that he or she has an equivalent academic or professional background, AND (b) receives my advance permission to enroll. Limited enrollment. Satisfies writing requirement. R. Schnur.

This is an advanced seminar that, after reviewing the basic federal income tax principles governing taxable and nontaxable corporate mergers and acquisitions, will introduce students to some of the more complex transactional tax issues and will explore how these tax concepts are utilized in structuring acquisition transactions. The emphasis will be on domestic rather than cross-border acquisitions. There will be no final examination, but students will be asked to prepare several planning memoranda directed at different merger and acquisition fact patterns.

LAW 7313 International Cooperation

Fall. 3 credits. Letter grades only. Limited enrollment. Satisfies writing requirement. A. Efrat.

The seminar examines—both theoretically and empirically—the establishment of international cooperation through legal rules and institutions in various areas, including security (laws of war; alliances; arms control); legal and illicit trade; human rights; intellectual property rights; and foreign investment. Additional topics include international adjudication, the United Nations, and the European Union. The seminar will be based on class discussions, in which we will critically consider the relevant literature. We will also apply our theoretical understanding of international cooperation to current events (e.g., how should we assess the recent efforts for UN reform?). Grade will be determined on the basis of participation in class discussion and a final paper on a topic related to the seminar's themes.

LAW 7321 International Criminal Law

Spring. 3 credits. Letter grades only. Limited enrollment. Satisfies writing requirement. M. B. Ndulo.

The seminar examines the questions surrounding international criminal law as a separate discipline and the sources of and basic principles underlying the subject. Particular attention will be paid to the question of jurisdiction over international crimes. It will consider international crimes such as aggression; war crimes, crimes against humanity, terrorism, and torture. It will also consider the treatment of past human rights violations in post conflict situations. It will further consider procedural aspects of international criminal law and the forums that deal with international crimes. In that context, it will look at the structure, jurisdiction and jurisprudence of Truth Commissions; the International Criminal Court (The Rome Statute); the former Yugoslavia Tribunal; Rwanda Tribunal and extradition and mutual legal assistance. The format will be class discussions of assigned readings. Final assessment in the course will be based on participation in class discussions and a written paper on a subject falling within the themes of the seminar. Paper topics must be submitted to the instructor for review not later than the third week of class. Each student is expected to give a presentation based on his or her paper to the class.

LAW 7352 International Law and Imperialism

Spring. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. A. Anghie.

This seminar explores the relationship between imperialism and international law through an examination of historical materials and the writings of scholars and jurists from the 16th century to the present. We will study relevant legal doctrines—such as conquest, terra-nullius and self-determination—and theories used to account for colonialism and decolonization, and the efforts of newly independent countries to reform international law. In studying these themes and issues, we will contrast traditional understandings of the relationship between imperialism and international law with alternative interpretations, and consider these in the context of broader contemporary debates about the nature and theory of international law. We will also study the work of scholars

writing in the tradition of Third World Approaches to International Law (TWAAIL).

LAW 7322 International Taxation

Spring. 3 credits. S-U or letter grades. Prerequisite: Federal Income Taxation. LL.M. students must secure permission of instructor. Limited enrollment. Satisfies writing requirement. R. A. Green.

This seminar examines the principles underlying the U.S. taxation of U.S. persons who earn income abroad and the U.S. taxation of foreign persons who earn income in the United States.

LAW 7332 International Women's Rights

Fall. 3 credits. Letter grades only. Limited enrollment. Satisfies writing requirement. M. E. Greenberg.

Since the Fourth World Conference on Women in 1995 and the Beijing Platform for Action, the focus on women's rights has expanded to engage advocates worldwide, reach beyond international frameworks to the national and community levels, involve men in promoting women's rights, and paying attention to economic and social rights. Yet violations of women's rights remain pervasive and tragic. While global exchange of information, alliances and experience have increased the use of legal mechanisms, they have also raised questions about their limitations. This seminar will have three dimensions: conceptual and historic foundations, international and regional legal systems, and multi-faceted strategies for promoting and protecting women's rights. We will address legal literacy and access to law, influences of religion and culture, the roles of regional women's networks and local civil society, and comparisons with gender equality objectives and gender mainstreaming. The seminar requirements will be: (1) Regular attendance and active participation in class discussions, (2) Team presentation on a region of choice, (3) a take-home midterm, and (4) a major seminar paper.

LAW 7371 Islamic Law and History

Fall. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. D. S. Powers.

This course is designed to introduce law students to the terminology, principles, and concepts of classical Islamic law. After discussing the origins and evolution of Islamic law, we will turn first to the organization of qadi courts (procedure and evidence) and then to specific areas of the law, e.g., personal status (marriage and divorce), the intergenerational transmission of property (bequests, gifts, and endowments), commerce (contracts, hire, allocation of loss), and crime. The application of legal doctrine to actual disputes will be analyzed through the reading of expert judicial opinions or fatwas (in English translation) issued in connection with medieval and modern court cases.

LAW 7392 Jurisprudence of War

Spring. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. J. Ohlin.

An investigation of the deeper theoretical and conceptual problems underlying the Law of War, including current constitutional developments regarding habeas corpus rights for battlefield detainees; the categories of enemy combatant and War on Terror; the legal definitions of terrorism and torture; the collective nature of genocide, aggression, and crimes against humanity; and modes of

liability in international criminal law, including the doctrines of conspiracy, joint criminal enterprise, co-perpetration, and command responsibility. Students are required to write a seminar paper on a topic to be chosen in consultation with the professor.

LAW 7411 Law and Higher Education

Spring. 3 credits. Letter grades only. Prerequisite: Constitutional Law or Administrative Law. Limited enrollment. Satisfies writing requirement. J. J. Mingle.

Higher education is a complex, idiosyncratic institution. Universities and colleges have a unique mission—teaching, research, and public service—and a uniquely challenging task of accommodating the various constituencies and organizations, both internal (governing boards, faculty, students, alumni) and external (legislatures, courts, regulatory agencies) that influence how they are managed and how policies are shaped. This seminar explores the dynamic tensions, high expectations, and complex legal-policy issues universities and colleges face in fulfilling their mission.

LAW 7561 Legal Aspects of Commercial Real Estate Development

Spring. 3 credits. Letter grades only. Prerequisite: first-year Property course or the equivalent. Limited enrollment. Satisfies writing requirement. J. E. Blyth.

Through the use of several written memoranda and one oral presentation, this seminar addresses considerations basic to commercial real estate development. It focuses on purchase agreements, options, rights of refusal, and memoranda thereof; representations and warranties; disclosure required of brokers and sellers; attorneys as brokers; notarial misconduct; conveyancing and surveys; commercial leases; conventional financing; conflicts between commercial tenants and institutional lenders; alternatives to conventional financing; title insurance; attorney opinion letters; and choice of real estate entity. About half of the semester is devoted to commercial leases, conventional financing, and alternatives to conventional financing (such as tax-exempt financing, mezzanine financing).

LAW 7580 Markets, Morals, and Methods

Spring. 3 credits. Letter grades only. Limited enrollment. Satisfies writing requirement. R. C. Hockett and K. Basu.

This seminar, open to law students and graduate philosophy and economics students, is devoted to the foundations of choice, agency, and welfare—matters that lie at the core of normative legal and economic theory. It is jointly run by Kaushik Basu, Chair of Economics at Cornell, and Robert Hockett, of the Cornell Law School.

Readings, guest speakers, and class discussion will focus on the nature of preferences, reasons, and norms, as well as (a) their interrelations and (b) their roles in guiding human decision and action. A central theme will be the question whether and to what degree welfare, well-being, and wealth for that matter can be understood apart from and even as determinative of normative propriety ("rightness" and "wrongness"), or whether instead these concepts presuppose a prior conception of normative propriety. Many legal and economic theorists seem to assume the former, but this assumption can—and in this course will—be examined critically. Approximately half of the class sessions will

feature presentations by distinguished legal theorists, welfare economists, and philosophers. The other class sessions will be devoted to discussion of papers sent in advance by these guests, as well as complementary work by others.

LAW 7582 Memory and the Law (also HD 6190)

Fall. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. C. Brainerd.

This course will focus on how the scientific study of human memory interfaces with the theory and practice of law. Students will study relevant areas of memory research (e.g., storage, retrieval, false memory, memory deficits in impaired populations) and memory theory. Students will also study specific areas of legal practice in which the reliability of evidence is critically dependent on human memory (e.g., eyewitness identification, recovery of repressed traumatic memories, confessions, elderly witnesses, child witnesses). Readings will come from primary library sources.

LAW 7591 Mergers and Acquisitions

Fall. 3 credits. S-U or letter grades.

Prerequisite: Prior or concurrent: basic Business Organizations/Corporations class at Cornell or another U.S./Canadian law school. Prior (not concurrent): basic Contracts class from Cornell or another U.S./Canadian law school or basic contracts class (from any other law school) deemed comparable by the professors. Limited enrollment. Satisfies writing requirement. M. I. Greene and R. A. Hall.

The focus of this course is developing the lawyering skills required by an attorney advising a client who is selling or acquiring a business. Individual drafting exercises, as well as strategy discussions and negotiations by student teams acting as counsel to the buyer or seller, will be interspersed with lectures on the business acquisition process and analysis of selected publicly available documentation of actual acquisition transactions. The typical chronology of an acquisition: negotiation by the buyer and the seller of the basic terms of the deal including selection of structure (sale of stock or assets; merger); drafting and negotiation of a term sheet or letter of intent; due diligence investigation; drafting and negotiation of the definitive acquisition agreement; handling of problems encountered between the execution of the agreement and the closing of the acquisition; and the closing.

LAW 7594 Neuroscience and the Law

Fall. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. P. Johnson.

This seminar examines key findings and implications for the law in the rapidly expanding field of neuroscience. Topics to be covered include the neurobiology of decision-making and memory, issues of gender difference in brain function, and the neurophysiology of trauma, addiction, and aggression. Attention will also be given to recently developed technologies for observing the human brain, the history and philosophy of clinical diagnosis as related to psychopathology and deviant behavior, and to prisons as asylums. The goal of the seminar is to enable students to integrate cutting-edge scientific findings and related controversies into their understanding and approach to legal practice in such areas as criminal justice,

mental health disability, domestic violence, gender equity, and child welfare.

LAW 7594 New York Civil Practice

Spring. 3 credits. S-U or letter grades. Prerequisite: Full year of Civil Procedure. Limited enrollment. Satisfies writing requirement. Satisfies professional responsibility requirement. N. E. Roth.

The course will explore the idiosyncrasies and intricacies of New York practice and procedure, with a particular focus on practice in the New York Supreme Court (the primary court of general original jurisdiction in New York). The course will also examine rules concerning civility in litigation and the ethical boundaries of zealous representation.

LAW 7601 Organized Crime Control

Fall. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. R. Goldstock.

This seminar will explore the challenges organized crime poses to society and to traditional law enforcement techniques. Students will undertake a simulated investigation using physical and electronic surveillance, the analysis of documentary evidence, and the examination of recalcitrant witnesses before the grand jury. The RICO statute will be explored in detail as well as a variety of non-criminal remedies including forfeiture and court-imposed trusteeships.

LAW 7631 Pretrial Practice, Litigation Strategies, and Remedies in Commercial Litigation

Fall. 3 credits. S-U or letter grades. Prerequisite: Civil Procedure and Contracts or Contracts in a Global Society. Limited enrollment. Satisfies writing requirement. Satisfies professional responsibility requirement. A. M. Radice and M. D'Amore.

This seminar studies the strategies of complex commercial litigation, focusing on case development in the pretrial period. It will address strategies and approaches to pleadings, jurisdiction, motions, pretrial discovery and remedies (e.g., preliminary injunctions, damages) in the context of difficult and unclear legal issues. Hardball litigation techniques and ethical considerations will be considered as well as the use of litigation to achieve business goals. Actual litigated cases will be dissected and papers in the form of briefs and memoranda will be written on each. Since 90 percent of commercial cases settle before trial, this seminar will be a real life presentation of the commercial litigation process.

LAW 7654 Special Problems in Trial Practice

Fall. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. E. Ainslie.

An examination of professional problems faced by American trial lawyers, e.g. unethical judges, ineffective opposing counsel, unpreparable witnesses and lying clients, as well as practical trial strategy issues in more typical trials. Readings from real cases, including several from the instructor's case-files over decades of trial practice.

LAW 7783 Topics in Intellectual Property

Spring. 3 credits. Letter grades only. Limited enrollment. Satisfies writing requirement. O. Liivak.

Sizable disagreement and controversy surround many areas of intellectual property. This seminar explores these disputes. By

surveying the academic literature the seminar aims to introduce, understand, and ultimately critique the arguments being made for and against various aspects of intellectual property.

LAW 7785 War Crimes Trials

Fall. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. Satisfies professional responsibility requirement. M. Rosensaft.

Beginning in November 1945, in an unprecedented attempt to bring war criminals to justice, more than 20 senior government officials and military leaders of Hitler's Third Reich were indicted and tried, in what has become known as the Nuremberg Trial, for crimes against peace, war crimes, and crimes against humanity. Earlier that fall, the SS commandants, officers, and guards who had been arrested by the British upon the liberation of the Bergen-Belsen concentration camp, had been tried before a British military tribunal. These were the first of numerous trials of Nazi war criminals and related criminal and civil proceedings arising out of the Holocaust. This seminar will examine legal and ethical issues raised in these and other trials of Nazi war criminals and individuals accused of collaborating with the Nazis in perpetrating crimes against humanity, including the Eichmann Trial in Jerusalem, the Auschwitz Trial of former SS officials and guards held in Frankfurt-am-Main, Germany in 1963-65, the 1963-64 Tel Aviv trial of Hersz Barenblat, the head of the Jewish police in the ghetto of Bedzin, Poland, and the trials of Klaus Barbie (1987), Paul Touvier (1994), and Maurice Papon (1997-98) in France.

LAW 7784 The War on Drugs

Fall. 3 credits. S-U or letter grades. Limited enrollment. Satisfies writing requirement. M. J. Satin.

The United States incarcerates more people for drug offenses than any other country. Of the more than 2 million people in prisons or jails, approximately one-quarter of those people have been convicted of a drug offense. This seminar examines America's War on Drugs, including its evolution and development over the past forty years, its successes and failures, and its social and economic consequences. Specific attention will be paid to its impact on the poor and people of color. To that end, the seminar will examine the basis for and effect of disparities in sentences between crack and cocaine offenses as well as recent federal cases and legislation on this subject. Other topics include mandatory minimum sentences, drug treatment and drug court, the movement to legalize drugs, mandatory drug testing in schools and in sports, and U.S. foreign policy towards countries supplying drugs. Students will be expected to write a weekly paper on the reading.

CLINICAL COURSES AND EXTERNSHIPS

All clinical courses and externships have limited enrollment.

Admission to all clinic courses is instructed selected.

Detailed clinical descriptions may be found at: <https://support.law.cornell.edu/students/forms/ClinicalCoursesAndExternshipsDescriptions.pdf>.

LAW 7802 Capital Appellate Clinic

Fall. 4 credits. S–U or letter grades.
Prerequisite: permission of instructor; Criminal Procedure, Evidence, and the Capital Punishment Seminar are preferred but not required. Limited enrollment.
J. H. Blume and S. L. Johnson.

Students in this clinic will assist in the preparation of appellate briefs in selected capital cases. Students will work intensively with the record, research legal issues, and draft arguments. Unlike most of the death penalty clinics, no travel is expected.

LAW 7811 Capital Punishment Clinic: Post-Conviction Litigation

Spring. 4 credits. S–U or letter grades.
Prerequisite: permission of instructor; Criminal Procedure, Evidence, and the Capital Punishment Seminar are preferred but not required. Limited enrollment. Note: This course may require off-premises travel. The Cornell Death Penalty Project will reimburse students for reasonable travel expenses. S. L. Johnson.

Death penalty litigation: investigation and the preparation of petitions, memoranda, and briefs. This course is taught as a clinic. Two or possibly three capital cases are worked on by students. Case selection depends on both pedagogical factors and litigation needs of the inmates. Students read the record and research legal issues. Some students are involved in investigation, while others assist in the preparation of papers. All students are included in discussions regarding the necessary investigation, research, and strategy for the cases.

LAW 7812 Child Advocacy Clinic I

Spring. 4 credits. S–U or letter grades.
Prerequisite: permission of instructor. Limited enrollment. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites.
A. J. Mooney.

Students will participate in the representation of children who are the subject of family court proceedings. Cases are likely to involve children who are the subjects of petitions such as: abuse or neglect, custody, termination of parental rights, status offense and juvenile delinquency. Students will interview clients and their families, prepare documents such as pleadings, motions, pre-trial memos and proposed findings of fact, and participate in court conferences and hearings. The in-class component of the course will address cross-disciplinary concerns such as working with other professionals and using social science to assist a client. Additionally, the course will focus on child development and the particular ethical concerns involved with the representation of children.

LAW 7813 Child Advocacy Clinic II

Spring. 4 credits. S–U or letter grades.
Prerequisite: Child Advocacy Clinic I. Limited enrollment. A. J. Mooney.

Students in Clinic II will: (1) work directly on law guardian cases, taking greater responsibility and working more independently than they are able to in the Child Advocacy Clinic; (2) develop a more in-depth knowledge of the field of child advocacy by participating in a weekly reading group; (3) act as mentors for students in the Child Advocacy Clinic, answering simple questions and providing emotional support for students who are often encountering, for the first time in their lives, stark poverty and

violence; (4) act as liaisons between the students in the Child Advocacy Clinic and the instructor, helping to identify areas in which the Clinic students need further instruction; (5) act as teaching assistants, reviewing work products of the Clinic students and assisting them in locating research, formbooks, and samples of court documents.

LAW 7833 Criminal Defense Trial Clinic

Fall. 4 credits. S–U or letter grades.
Prerequisite: Evidence recommended or with permission of instructor. Limited enrollment. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites. L. Salisbury.

Students represent defendants in non-felony, non-jury criminal cases. The course has both a classroom and courtroom component. The classroom component focuses on all aspects of the handling of a criminal case, including criminal law and procedure, ethics, trial strategy, plea bargaining and trials. The courtroom component involves attendance at court proceedings, including pre-trial conferences. Each student will interview clients and witnesses, prepare clients and witnesses for trial, conduct negotiations, do legal research, conduct fact investigation, prepare discovery demands and engage in motion practice.

LAW 7831–7832 Full-Term Externship

Fall, spring. 12 credits. S–U grades only.
Prerequisite: permission of instructor. Limited enrollment. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites.
G. G. Galbreath.

The Full-Term Externship course allows students to earn 12 credit hours as externs working full time at approved placement sites (most are with non-profit organizations or governmental agencies) during the fall or spring semester of their third year or the spring semester of their second year. A written application for the course must be submitted to the instructor and approved during the semester preceding the semester the student plans to participate. The student must be supervised/mentored by an attorney and engage in meaningful and “attorney-like” work at the placement which furthers the student’s education and career goals. In addition to his or her work responsibilities for the placement, the extern will prepare weekly journal entries, engage in regular electronic communication with the other extern and instructor, host the instructor for a site visit, and do a written evaluation of the placement experience.

LAW 7801 Immigration Appellate Law and Advocacy Clinic

Spring. 4 credits. S–U (with permission of instructor only) or letter grades.
Limited enrollment. S. Kalantry and S. W. Yale-Loehr.

Students will learn asylum and Convention Against Torture law and immigration and appellate procedure in class lectures. In the practice component of the clinic, students will develop skills such as brief-writing, interviewing, fact-finding and legal researching. Some students will write appellate briefs to the Board of Immigration Appeals on behalf of clients who have petitioned to remain in the United States because they fear persecution or torture in their home countries. Other students in the class may work on advocacy projects involving drafting proposed legislation, advocating for immigration reform,

or other advocacy work around emerging issues in immigration such as prolonged detention and unconstitutional raids. Students may interview clients over the phone during this time, with the possibility of face-to-face interviews. Some clients may be incarcerated, and many will be out-of-state. Students may also locate expert and other witnesses, and draft affidavits and motions. This course may require off-premises travel.

LAW 7855 International Human Rights Clinic

Fall, spring. 4 credits. Letter grade. S–U (with permission of instructor only). Recommended prerequisites: International Human Rights and Public International Law. Limited enrollment. This course may require off-premises travel. S. Kalantry.

In this clinic students will learn substantive human rights law as well as human rights lawyering and advocacy skills. Students will learn to describe issues in human rights terms, formulate demands using human rights accountability tools, and develop strategies that utilize key features of human rights law. Students will develop their international research and writing, and communication skills by working in teams on projects for international organizations and judges. The projects may involve legal action such as impact litigation, legal assistance and counseling, or fact-finding and reporting or human rights education and training, including judicial training.

LAW 7861 Judicial Externship

Fall. 4, 5 or 6 credits. S–U or letter grades. Limited enrollment. Note: The course requires travel to the placement court. Some are within walking distance and some are over an hour away. The student must arrange for her/his own transportation. G. G. Galbreath.

Students work part time with a trial or appellate state or federal judge in central New York. Work involves courtroom observation, conferences with the judge and law clerk(s), research and writing memoranda and drafting decisions. Emphasis is on learning about judges, judicial decision-making and trials or appeals. There are weekly class sessions with readings and discussions of topics related to the externship experience. While the primary focus of the course is the student’s work at the court placement, each student will also do class presentations, weekly journal entries, provide written work samples and meet individually with the instructor.

LAW 7871 Labor Law Clinic

Spring. 4 credits. S–U or letter grades. Prerequisite: preference is given to students who have taken Labor Law. It is helpful to have taken Administrative or Employment Law, but not required. Limited enrollment. Note: This course may require off-premises travel. Please contact the professor if this is an obstacle. A. Cornell. The Labor Law Clinic will provide students a practical opportunity to learn labor law, while making meaningful contributions to the labor movement and working people. This clinic will combine a substantive component with practical experience. Students will advise labor unions on a variety of legal issues that surface during the semester and may have the opportunity to represent unions in different forums. Students will communicate directly with union representatives and will be required to sort through the facts, research the

issues, and provide information and advice. Students will routinely draft legal memoranda, prepare and file pleadings and briefs as required. Students may have the opportunity to represent unions at hearings, mediation or arbitration. Students may also be required to observe a hearing before the National Labor Relations Board, Public Employment Relations Board or an arbitration. Students have also been invited to observe the collective bargaining process. A small number of students will have the opportunity to dedicate their clinical time to international labor law. Interested students can support the ongoing work of the International Commission for Labour Rights, a non-profit organization, or a global union federation with ongoing cases or projects. Student contribution in this area is likely to be research oriented.

LAW 7872 Land Use, Development, and Natural Resource Protection Clinic

Spring, 4 credits, S-U or letter grades.

Prerequisites: Land Use and/or Water Law Clinic recommended. Limited enrollment. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites. K. S. Porter.

Issues of how land use and development may be managed to control, protect, and conserve natural resources, particularly water, are coming to the forefront of national and international policy. Land use policy is fundamental to both economic development and the protection of natural resources. The rich and complex body of law that balances often-competing needs of different stakeholders involves areas of law as diverse as land use, real estate, property, tax, contract, tort, local government, and water and environmental law. Often, even when stakeholders share a uniform vision, the transaction costs involved in executing alternative development plans are prohibitively high. This clinic provides students with the opportunity to work hands-on to identify, design and implement economically and politically viable solutions to environmental problems arising from land use decisions. Participating students will assist clients such as developers, government agencies, community leaders, and public interest groups with a wide range of services. An increasingly critical concern is the role of land use and development on the quantity and quality of water resources. Potential projects include drafting/reviewing municipal ordinances and inter-municipal agreements; consulting on design parameters for development sites (i.e., what type of density is possible, what type of variances are available); drafting petition/explanatory documents for clients who wish to obtain variances; resolving compliance issues with state and local laws; and attending meetings and advocating for clients. Because this clinic offers a great variety of transactional work, it will be of benefit to most students who are interested in transactional practices, particularly those interested in a career in real estate, land use, finance, general practice, and environmental law.

LAW 7881 Law Guardian Externship

Fall, spring, 4 credits. S-U or letter grades. Limited enrollment. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites. A. J. Mooney.

Students are placed at Citizens Concerned for Children, the local Law Guardian Office, where they assist the attorneys in the representation of children in abuse and

neglect cases, juvenile delinquency proceedings, and PINS (Person in Need of Supervision) cases. Students also may have their own cases, in which they will assume primary responsibility for the representation. Duties may include interviewing, investigation, drafting memoranda and motions, and trial preparation. There will be several meetings with the instructor during the semester. Bi-weekly journals are also required.

LAW 7901 Legislative Externship

Fall, spring, 3 credits. S-U or letter grades. Students selected by Assemblywoman Lifton. Limited enrollment. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites. B. Strom.

Students work with the local New York State Member of Assembly. Work involves drafting legislation, tracking legislation for constituents, legal research and writing, and responding to constituent requests that particularly require legal research of an explanation of law. The emphasis is on learning about legislative process, drafting of legislation, understanding the reasons for statutory ambiguity, and developing various skills. There are several informal meetings with the faculty supervisor related to the externship experience.

LAW 7911-2-3 Neighborhood Legal Services Externship 1, 2, or 3

Fall, spring, 4 credits. S-U or letter grades. Limited enrollment. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites. B. Strom.

Classroom component is provided by Clinical Skills 1, 2 (fall), or 3 (spring) depending on whether the student has previously been enrolled in a course in which Clinical Skills 1 was a component. Cases involve the representation of clients of a legal services office, the Ithaca office of Neighborhood Legal Services (NLS). Along with case handling, this externship includes a classroom component, provided by Clinical Skills 1, 2, or 3. The classes are devoted to the development of lawyering skills and issues related to professional responsibility and the role of an attorney. In addition, each student will meet periodically with the faculty supervisor for review of the placement experience.

LAW 7921 Prosecution Trial Clinic

Fall, 4 credits. S-U or letter grades. Prerequisite: Evidence or permission of instructor. Interested students will need to submit a statement of interest and resume to Prof. Robert Sarachan by July 15, 2009. Limited enrollment. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites. R. A. Sarachan.

This course gives students the opportunity to prosecute non-felony non-jury trials in Ithaca City Court. The course has both a classroom component and a courtroom component. The classroom component involves lecture, discussion and trial simulation exercises. Topics include criminal law and procedure, prosecution ethics, trial strategy and preparation, trial conduct including direct and cross-examination, plea-bargaining and professional judgment. The courtroom component involves regular attendance at Ithaca City Court's non-jury terms. Students will observe and critique trials and will prosecute offenses including traffic tickets (such as speeding and running a red light),

city code violations (such as open container and noise offenses), non-felony penal law violations (such as disorderly conduct, possession of marijuana) among others. Each student will be expected to conduct multiple trials during the semester, depending on docket volume. During the semester students will also be expected to prepare witnesses (typically police officers), conduct plea-bargaining negotiations, case research and fact investigation, respond to discovery demands, and engage in motion practice and appellate practice as needed.

LAW 7931 Public Interest Clinic 1

Fall, spring, 4 credits. S-U or letter grades. Limited enrollment. Note: This course may require travel for purposes of participating in hearings. G. G. Galbreath and B. Strom.

Students handle civil cases for low-income clients of the Public Interest Clinic under the supervision of clinic faculty. Students interview and counsel; investigate and analyze facts; interrelate substantive and procedural law with facts in the context of actual representation; develop strategies to handle clients' problems; identify and resolve professional responsibility issues; do legal writing; negotiate and settle cases; and represent clients in hearings. Classroom component is provided by the Clinical Skills 1 class, in which students will develop interviewing, counseling, and advocacy skills through the use of readings, videotapes, discussions, and simulation exercises.

LAW 7932 Public Interest Clinic 2

Fall, 4 credits. S-U or letter grades.

Prerequisite: Public Interest Clinic 1 or a clinic course that included the Clinical Skills 1 classroom component. Limited enrollment. Note: This course may require travel for purposes of participating in hearings. G. G. Galbreath and B. Strom. Students handle civil cases, participate in a classroom component, Clinical Skills 2, and help supervise participants in Public Interest Clinic 1. Cases are handled as described in the course description for Public Interest 1. Students represent the clinic's clients in both federal and state courts. Clinical Skills 2 builds on the skills taught in Clinical Skills 1.

LAW 7933 Public Interest Clinic 3

Spring, 4 credits. S-U or letter grades.

Prerequisite: Public Interest Clinic 1 or a clinic course that included the Clinical Skills 1 classroom component. Limited enrollment. Note: This course may require travel for purposes of participating in hearings. G. G. Galbreath and B. Strom. Students handle civil cases, participate in a classroom component, Clinical Skills 3, and help supervise participants in Public Interest Clinic 1. Cases are handled as described in the course description for Public Interest 1. Students represent the clinic's clients in both federal and state courts. Clinical Skills 3 builds on the skills taught in Clinical Skills 1 and 2.

LAW 7953-7954-7955 Securities Law Clinic 1, 2, and 3

Fall, spring, 4 credits. S-U or letter grades.

Prerequisites: None. Pre- or co-enrollment in Securities Regulation or Dispute Resolution recommended but not required. Limited enrollment. Note: This course may require off-premises travel for potential client and witness interviews, hearings, and community presentations. Assistance will be provided to students who lack available transportation. W. A. Jacobson.

The course will focus on fundamental investigatory and advocacy skills applicable to representation of public investors in disputes subject to arbitration at the Financial Industry Regulatory Authority (f/k/a National Association of Securities Dealers), with particular attention to the elderly and to small investors. Substantive legal topics will include the scope and nature of binding arbitration under the Federal Arbitration Act and New York law, and the legal and regulatory remedies available to defrauded investors. Coursework will include training in skills such as interviewing potential clients, evaluating potential claims, preparing pleadings, conducting discovery, representing clients at hearings and negotiating settlements. Class work will include presentations by nationally-recognized experts on topics applicable to evaluation of securities accounts, trading, and products. Students will have the opportunity under faculty supervision to represent investors, to provide public education to community groups as to investment frauds, to draft position statements to regulatory authorities, and/or to participate in preparing amicus briefs, in support of public investors.

LAW 7951-7952 U.S. Attorney's Office Clinic 1 or 2

Fall, spring. 6 credits. S–U grades only. Registration for the fall offerings was handled by the U.S. Attorney's Office in February 2009. Limited enrollment. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites. C. E. Roberts.

The United States Attorney's Office Clinic is a program in which law students work 12-15 hours per week for the United States Attorney's Office in Syracuse, New York. Each student is assigned to work for an Assistant United States Attorney. Students perform research and writing, and trial assistance as needed. Students may qualify to appear in court under the supervision of their attorney, and are encouraged to observe court proceedings in the U.S. Courthouse. Students also attend a two hour seminar once a week at Cornell. The seminar will focus on writing in practice, including critiques of briefs, motions, and a petition for certiorari. Additional topics include federal criminal and civil practice, prosecutorial discretion, and habeas corpus. Guest speakers may include judges, a special prosecutor, and U.S. Department of Justice officials. Students must be a U.S. citizen. A detailed course description is available at <https://support.law.cornell.edu/students/forms/ClinicalCoursesAndExternshipsDescriptions.pdf>.

LAW 7961 Water Law in Theory and Practice 1

Fall. 4 credits. S–U or letter grades. Limited enrollment. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites. K. S. Porter. Competing uses of water resources pose high stakes. Serious conflicts now arise with increased frequency. There is growing necessity for effective legal instruments and methods of conflict resolution to avert or resolve disputes. The Clinic addresses problems of law related to water through collaboration, consultation, relevant research and writing. This involves selecting and working on a topic, or a dispute, of local, regional, national or international importance with leaders and experts having knowledge or involvement in the issues of the topic. A

specific purpose of the clinic is to provide real world transactional experience particularly in resolving or avoiding disputes. Students have available for their projects the extensive network of resources initially established through the New York State Water Resources Institute based at Cornell University.

Under faculty supervision, each student selects a project on a topic or dispute of theoretical and practical legal importance. Students consult and work with attorneys, professional staff and stakeholders engaged in work to which the project applies. Projects generally involve the following steps: Identifying and defining the problem or dispute; Formulating a procedure for the project including prospective cooperators and "clients"; Developing a basic understanding of the legal issues and applicable methods through the relevant literature and documents; Participating in on and off-campus meetings, and field trips; Obtaining assistance, as relevant, of faculty in the various colleges and departments at Cornell University. (Cornell University is preeminent in its faculty and staff resources with interests in the multiple aspects of water and land resource management.); Presenting the progress and results of their project to interested groups and clients, and to the class.

NON-PROFESSIONAL COURSES—NOT OPEN TO LAW STUDENTS

LAW 4021 Competition Law and Policy

Fall. 4 credits. Letter grades only. G. A. Hay.

This course will examine issues that arise when a country attempts to implement and maintain a "competition policy" as a way of promoting economic growth and efficiency. The basic reading material will start with actual cases (most of them arising under U.S. antitrust law), and use those cases to probe the legal, economic and broad policy issues that the cases raise. This course is intended for non-law students; law students interested in the subject should take the Antitrust Law course. The course requires no legal training or background. Economics 101 (Elementary Microeconomics) or its equivalent is a prerequisite. The course can be used by Economics majors as an equivalent to a 400-level Economics course.

LAW 4051 The Death Penalty in America

Spring 4 credits. S–U or letter grades. Undergraduates only. J. H. Blume and S. L. Johnson.

The death penalty has gotten increased media attention due to high profile death row exonerations, and has long been under siege for other reasons, such as racial disparities in its imposition and the prevalence of very poor representation by defense counsel. This course surveys the legal and social issues that arise in the administration of the death penalty. The reading will be largely comprised of reported death penalty cases, but will be augmented by a variety of other sources, including empirical studies of the death penalty and the litigation experience of the professors. Although the focus will be on capital punishment as practiced in the United States, we will also consider international and comparative perspectives. Guest speakers will provide a range of views, and law students with

experience working on capital cases will lead discussion sections.

LAW 4121 Gender, Public Policy, and Law

Fall. 4 credits. S–U or letter grades.

Undergraduates only. C. G. Bowman. The course will include, first, a brief introduction to the history of the women's movement in the United States and to the development of the constitutional standard for gender, followed by a sampling of the competing theoretical approaches that can be taken to legal problems involving gender—a formal equality approach, the dominance approach (exemplified by Catharine MacKinnon), relational or cultural feminism (a "differences" approach represented in the legal academy by Robin West and Mary Becker), socialist feminism, pragmatic feminism, and critical race feminism. After the constitutional and theoretical foundations have been laid, we will study a series of issues and issue areas where gender is critical to legal treatment—reproduction (abortion, surrogate motherhood and other reproductive technologies, for example), rape, domestic violence, prostitution, pornography, cohabitation, same-sex marriage, and other family law issues. We will both study how these issues are treated under current law and discuss what might be better approaches to each. In order to introduce students to the study of law, we will be using a textbook used in law school courses, Becker, Bowman, Nourse, and Yuracko, *Feminist Jurisprudence: Taking Women Seriously* (3d ed. 2007). No prior knowledge of legal analysis or concepts will be presumed. Requirements: two short (five-page) papers and a final exam.

LAW 4131 The Nature, Functions, and Limits of Law (also GOVT 3131)

Fall. 4 credits. Letter grades only.

Undergraduates only. A. Riles.

A general-education course for students at the sophomore and higher levels. The course will introduce students to different perspectives on what law is, what role it ought to play in society, and what it can—and cannot—accomplish. In addressing these questions, students will consider the different roles of legislatures, courts, and executives. Assigned readings consist of case law, commentaries on the legal process, social scientific articles, and works of literature addressing the role of law in society.

FACULTY ROSTER

Ainslie, Elizabeth K., LL.B., Harvard U. Distinguished Practitioner in Residence
Alexander, Gregory S., J.D., Northwestern U. A. Robert Noll Prof.
Anghie, Anthony, S.J.D., Harvard U. Visiting Prof.
Barceló, John J. III, S.J.D., Harvard U. William Nelson Cromwell Professor of International and Comparative Law
Blank, Yishai, S.J.D., Harvard U. Visiting Prof.
Blume, John H., J.D., Yale U. Prof.
Bowman, Cynthia G., J.D., Northwestern U. Dorothea S. Clarke Professor of Law
Chafetz, Josh, Ph.D., U. of Oxford. Asst. Prof.
Clermont, Kevin M., J.D., Harvard U. Robert D. Ziff Professor of Law
Clymer, Steven D., J.D., Cornell U. Prof.
Colb, Sherry F., J.D., Harvard U. Prof. and Charles Evan Hughes Scholar

Dorf, Michael C., J.D., Harvard U. Robert S. Stevens Professor of Law

Efrat, Asif, Ph.D., Harvard U. Visiting Assoc. Prof.

Eisenberg, Theodore, J.D., U. of Pennsylvania. Henry Allen Mark Professor of Law

Farina, Cynthia R., J.D., Boston U. Prof.

Garvey, Stephen P., J.D., Yale U. Prof.

Germain, Claire M., M.L.L., U. of Denver. Edward Cornell Law Librarian and Professor of Law

Green, Robert A., J.D., Georgetown U. Prof.

Hans, Valerie P., Ph.D., U. of Toronto (Canada). Prof.

Hay, George A., Ph.D., Northwestern U. Edward Cornell Professor of Law and Professor of Economics, College of Arts and Sciences

Heise, Michael, Ph.D., Northwestern U. Prof.

Henderson, James A., Jr., LL.M., Harvard U. Frank B. Ingersoll Professor of Law

Hillman, Robert A., J.D., Cornell U. Edwin H. Woodruff Professor of Law

Hockett, Robert C., J.S.D., Yale U. Assoc. Prof.

Holden-Smith, Barbara J., J.D., U. of Chicago. Prof.

Johnson, Sheri L., J.D., Yale U. Prof.

Knight, Leslie, J.D., U. of California, Davis. Lec.

Lasser, Mitchel, Ph.D., Yale U. Jack G. Clarke Professor of Law

Lehman, Jeffrey S., J.D., U. of Michigan. Prof.

Liivak, Oskar, J.D., Yale U. Asst. Prof.

Martin, Peter W., LL.B., Harvard U. Jane M. G. Foster Professor of Law

Meyler, Bernadette A., Ph.D., U. of California, Davis. Prof.

Ndulo, Muna B., D. Phil., Trinity C. Prof.

Ohlin, Jens, Ph.D., Columbia U. Asst. Prof.

Oman, Nathan B., J.D., Harvard U. Visiting Prof.

Penalver, Eduardo, J.D., Yale U. Prof.

Rachlinski, Jeffrey J., Ph.D., Stanford U. Prof.

Riles, Annelise, Ph.D., U. of Cambridge (U.K.). Jack G. Clarke Chair in Far East Legal Studies and Prof. of Anthropology, College of Arts and Sciences

Rossi, Faust F., J.D., Cornell U. Samuel S. Leibowitz Professor of Trial Techniques

Schwab, Stewart J., Ph.D., U. of Michigan. Prof.

Sherwin, Emily L., J.D., Boston U. Prof.

Shiffrin, Steven H., J.D., Loyola U. of Los Angeles. Prof.

Siliciano, John A., J.D., Columbia U. Prof.

Summers, Robert S., LL.B., Harvard U. William G. McRoberts Research Professor in Administration of the Law

Thomas, Chantal, J.D., Harvard U. Prof.

Underkuffler, Laura, J.S.M., Yale U. J. DuPratt White Professor of Law

Wendel, W. Bradley, J.S.D., Columbia U. Prof.

Whitehead, Charles K., J.D., Columbia U. Assoc. Prof.

Clinical Faculty

Angela B. Cornell, J.D., U. of Washington. Assoc. Clinical Prof.

Galbreath, Glenn G., J.D., Case Western Reserve U. Clinical Prof.

Jacobson, William A., J.D., Harvard U., Assoc. Clinical Prof.

Kalantry, Sital, J.D., U. of Pennsylvania. Asst. Clinical Prof.

Strom, Barry, J.D., Cornell U. Clinical Prof.

Lawyering Program Faculty

Atlas, Joel, J.D., Boston U. Clinical Prof.

Freed, Lara Gelbwasser, J.D., Harvard U. Assoc. Clinical Prof.

Mollenkamp, John R., J.D., U. of Texas. Assoc. Clinical Prof.

Mooney, Andrea J., J.D., Cornell U. Clinical Prof.

Weigold, Ursula H., J.D., Cornell U. Clinical Prof.

Whelan, Michelle Fongyee, J.D., U. of Florida. Asst. Clinical Prof.

Academic Library Staff

Callihan, Jean M., J.D., Pennsylvania State U. Head of Research Services and Lec. in Law

Court, Patricia G., J.D., Hamline U. Associate Law Librarian and Lec. in Law

Emerson, Amy A., J.D., Syracuse U. Research Attorney and Lec. in Law

Finger, Charles S., J.D., SUNY at Buffalo. Collection Development, Research Attorney and Lec. in Law

Germain, Claire M., LL.B., U. of Paris (France). Edward Cornell Law Librarian and Professor of Law

Gillespie, Janet M., M.S., Cornell U. Administrative Supervisor/Access Service

Mills, Thomas W., J.D., U. of Illinois. Head of Collections and Lec. in Law

Morrison, Matthew M., J.D., Mercer U. Research Attorney and Lec. in Law

Pajerek, Jean M., M.L.S., SUNY at Albany. Head of Technical Services and Information Management

Members of Other Faculties Associated with the Law School

Brainerd, Charles J., Ph.D., Michigan State U. Prof., College of Human Ecology

Carmichael, Calum, M., B.Litt., Oxford U. (U.K.) Prof., College of Arts and Sciences

Funk, David L., Ph.D., U. of Wisconsin. Sr. Lec. and Dir., Prog. in Real Estate, College of Architecture, Art, and Planning

Powers, David S., Ph.D., Princeton U. Prof., College of Arts and Sciences

Shulman, Zachary, J.D., Cornell U. J. Thomas Clark Senior Lecturer of Entrepreneurship, Johnson Graduate School of Management

Wells, Martin T., Ph.D., U. of California. Prof., School of Industrial and Labor Relations

Adjunct Faculty Members

Bachrach, Marion, J.D., Cornell U.

Beresford, H. Richard, M.D., U. of Colorado.

Blyth, John E., Dr.jur., Goethe U.

Briggs, W. Buckley, J.D., Georgetown U.

Bryan, Bruce R., J.D., Fordham U.

Campbell, Dana M., J.D., Lewis and Clark Coll.

D'amore, Matthew, J.D., Yale U.

Goldstein, Mark L., J.D., Cornell U.

Goldstock, Ronald G., J.D., Harvard U.

Greenberg, Marcia E., J.D., Northwestern U.

Greene, Mark I., J.D., U. of Pennsylvania

Hall, Richard, LL.M., Harvard U.

Johnson, Pamela J., Ph.D., Case Western Reserve U.

McGrath, Dana C., J.D., New York U.

Meyer, Judith P., J.D., Cornell U.

Mingle, James J., J.D., U. of Virginia

Newhart, Mary J., M.S., Cornell U.

Oxhorn, Melanie L., J.D., Harvard U.

Plant, David W., LL.B., Cornell U.

Porter, Keith S., LL.M., De Montford U. (U.K.)

Radice, Anthony M., J.D., Cornell U.

Roberts, Charles E., J.D., Syracuse U.

Rosensaft, Menacham Z., J.D., Columbia U.

Roth, Nelson E., J.D., U. of California, Davis

St. Landau, Norm D., J.D., Antioch C.

Salisbury, Lance, J.D., Cornell U.

Sarachan, Robert A., J.D., Indiana U. Bloomington

Satin, Michael J., J.D., Cornell U.

Schnur, Robert A., J.D., Harvard U.

Seeds, Christopher, J.D., Cornell U.

Weyble, Keir M., J.D., U. of South Carolina

Yale Loehr, Stephen W., J.D., Cornell U.

Yusem, Stephen G., J.D., U. of Pennsylvania

DIVISION OF NUTRITIONAL SCIENCES

ADMINISTRATION

Patrick Stover, director

Charles McCormick, director of undergraduate studies

Cha-Sook You, assistant director of undergraduate studies

Charles McCormick, director of graduate studies, field of nutrition

THE DIVISION

Nutritional science draws upon the chemical, biological, and social sciences to understand the complex relationships between human health, nutritional status, food and lifestyle patterns, and social and institutional environments. Understanding these relationships includes the study of the metabolic regulation and function of nutrients, nutrient requirements throughout the life span, the role of diet in reducing risk of chronic disease, the nutritional quality of foods, and interventions and policies designed to promote the nutritional health of individuals, communities, and populations.

The focus of this broad field of study at Cornell is the Division of Nutritional Sciences, which brings together specialists from many disciplines. Faculty members are involved in undergraduate and graduate teaching, research, and extension of research-based knowledge throughout New York State, the nation, and the world.

The division is affiliated with both the College of Human Ecology and the College of Agriculture and Life Sciences. The undergraduate program in Nutritional Sciences is offered to students enrolled in both colleges. The undergraduate program in Human Biology, Health, and Society is offered through the College of Human Ecology. A program of study in nutrition for biological science majors is offered in collaboration with the undergraduate program in biology. Graduate study in the field of nutrition is administered by faculty members throughout the university.

FACILITIES

Most of the faculty members of the division work in Savage Hall, Kinzelberg Hall, and Martha Van Rensselaer (MVR) Hall. In addition to housing offices, classrooms, and seminar rooms, these buildings contain research facilities, specialized laboratories, a human metabolic research unit, and computer facilities. Savage Hall has a graduate reading room and undergraduate student room.

UNDERGRADUATE PROGRAMS

The Division of Nutritional Sciences (DNS) offers three programs leading to a B.S. degree:

Nutritional Sciences (NS-CHE), College of Human Ecology: this program provides students with a strong foundation in the broad field of nutritional sciences as well as thorough training in chemistry and biology. Students may prepare for a variety of career interests, including medicine and other health careers, fitness and sports nutrition, nutrition counseling, clinical nutrition, dietetics, nutritional biochemistry, community nutrition, and nutrition education.

Nutritional Sciences (NS-CALS), College of Agriculture and Life Sciences: this program is for students who want strong training in human nutrition combined with supportive course work in agriculture and the life sciences. Strong preparation in biology, chemistry, and math is required. Students in the NS-CALS program supplement the nutrition curriculum with courses in areas such as food science, animal science, plant science, advanced biology, business and economics, education, and communication.

Human Biology, Health, and Society (HBHS), College of Human Ecology: established in 1997, this program gives students a strong foundation in biology. It then goes on to explore human health issues from the perspectives of both biology and the social sciences. Students complete a rigorous curriculum in the natural sciences and then, choosing from a wide array of courses offered in the College of Human Ecology, focus their studies on health issues of their choice. Students can explore such topics as gene expression and metabolism related to disease states, biological and social aspects of growth and development, and policies and programs influencing health.

The division also offers the **Program of Study in Human Nutrition for biological sciences majors** who may be enrolled in the College of Agriculture and Life Sciences or College of Arts and Sciences. The Program of Study in Human Nutrition offers biology majors courses on the nature and biochemical function of essential and nonessential nutrients, nutrient requirements, the role of nutrients in gene expression, and the role of diet in both risk of chronic disease and treatment of existing disease states. Students in this program of study are encouraged to complete a diverse set of advanced courses that afford a perspective on current knowledge of nutrient requirements and function and how this knowledge can be put to use. With the exception of a core course in the structure and function of nutrients, the course requirements are unspecified.

Faculty advisors work with individual students to develop a curriculum that fits the students' interests. As part of their program, students are encouraged to obtain laboratory experience either through course work or research. Students completing the program in nutrition most often choose to continue their education in medical or graduate school and pursue careers in the applied aspects of nutrition or in laboratory-based or epidemiological research.

THE CURRICULUM

Undergraduate students in these programs complete the requirements of their colleges as well as the courses required by the program of their specific interest.

Both the NS and HBHS programs require a rigorous sequence of courses in chemistry and biology, including introductory chemistry and biology, organic chemistry, biochemistry, and physiology. A minimum competency in college algebra is required with an additional math and/or statistics requirement for some programs and career paths. Students in the HBHS major also complete a course in physics and two additional courses in advanced biology.

All students complete the introductory course NS 1150 Nutrition, Health, and Society. The NS program requires the completion of four other core courses: NS 2450 Social Science Perspectives on Food and Nutrition; NS 3450 Introduction to Physicochemical and Biological Aspects of Foods; NS 3310 Physiological and Biochemical Bases of Nutrition; and NS 3320 Methods in Nutritional Sciences. Students in these programs also must select a minimum of 9 credits in advanced courses in the nutritional sciences.

The HBHS major requires 15 credits of advanced electives that explore health issues from primarily a biological or a social perspective. These courses are offered by faculty in several departments within the College of Human Ecology.

Undergraduate students in these programs have a faculty advisor with whom they meet at least twice a year. Advisors help students plan their course schedules and can suggest opportunities for individual study or experience outside the classroom.

In both undergraduate programs the correct sequencing of biology, chemistry, and/or nutrition courses is very important. Students considering these programs should obtain detailed information about course requirements from the division's Academic Affairs office, B21 Savage Hall. This office offers a wide range of advising materials to help students develop a program of study that matches their interests and needs.

CAREER OPTIONS AND COURSE PLANNING

Requirements for the programs are the minimum set of courses necessary for a bachelor's degree in these fields. Students should supplement their requirements with elective courses and other learning experiences that will prepare them for entry-level jobs or advanced study in their field(s) of interest. A summary of suggested electives for different career interests follows:

Medicine and Other Health Careers: Recommended courses for pre-med students include calculus and two semesters of physics.

Specific information about medical school admissions requirements can be obtained from the university's Health Careers office, 203 Barnes Hall. Students interested in other health careers should acquire specific information about those requirements. Courses of interest may include those related to the biological and social determinants of health; human growth, development, and behavior through the life course; interpersonal communications; advanced biology; sociology; psychology; and ethics.

Dietetics: Students who wish to work in the areas of clinical nutrition, nutrition counseling, sports nutrition, community nutrition, or food and nutrition management should complete the academic requirements for The American Dietetic Association (ADA). The Didactic Program in Dietetics is accredited by the Commission on Accreditation of Dietetics Education and provides students with the course work necessary for application to an accredited Dietetic internship or an Approved Pre-professional Practice (AP4) program. Students successfully completing didactic program requirements at Cornell are issued a Verification Statement. A one-time fee is involved to cover the cost of program materials and transcript evaluation. The Didactic Program in Dietetics policy and procedure for issuing verification statements can be found at nutrition.cornell.edu/dns7_dietetic.html. Upon completion of a Dietetic Internship or AP4 program, students are eligible to take the Registered Examination of the Commission on Dietetic Registration and become a Registered Dietitian (RD). Courses in foods, nutrition and disease, microbiology, management, statistics, and nutritional care are added to the courses required for the nutrition programs. For more information about meeting ADA requirements, contact the DNS Academic Affairs office, B19 Savage Hall.

Exercise, Nutrition, and Health

Promotion: Students should complete a course in physiology and a course in anatomy after introductory biology. Students can complete the Applied Exercise Science Concentration at Ithaca College, which includes courses in kinesiology, exercise physiology, and biomechanics. Students who wish to apply to graduate schools to study physical therapy should complete a year of introductory physics, a course in statistics, a course in ethics, and three courses in psychology. Students should check the specific requirements of their schools of interest. For information about the Applied Exercise Science Concentration, contact the DNS Academic Affairs office, B21 Savage Hall.

Biomedical Research/Nutritional

Biochemistry: Recommended electives include calculus, physics, genetics, advanced biology and chemistry, toxicology, and nutritional sciences courses related to the physiology, biochemistry, and metabolism of different nutrients and disease states.

Public Health and Community Nutrition:

Suggested electives include courses in communications, education, human development, policy analysis and management, maternal and child nutrition, geriatric nutrition, nutrition and disease, and food economics.

Nutrition, Food, and Business:

Recommended electives include courses in management, marketing, economics,

communications, hotel administration, and food science.

Nutrition and Agriculture: Recommended electives include courses in food science, animal science, plant sciences, international agriculture, agricultural economics, biological sciences, and development sociology.

International Nutrition: Recommended electives include courses in language, anthropology, agricultural economics, policy, economics, development sociology, international agriculture, and nutritional sciences related to maternal and child health and problems of developing nations.

Biology and Behavior: Recommended electives include courses in psychology, human development, and neurobiology.

Food, Nutrition, and Health Policy:

Recommended electives include courses in economics, sociology, government, policy analysis, and management.

SPECIAL EXPERIENCES

Undergraduates can enhance their experiences by participating in structured field experiences or study abroad. Academic credit can be earned for field experiences in a community agency, health care facility, or business. The Urban Semester in the College of Human Ecology provides students with an opportunity to study and gain field experience in New York City. All students intending to spend a semester off-campus in field experience or study abroad must plan their courses well in advance to be sure that all program requirements can be met.

INDEPENDENT STUDY ELECTIVES

Independent study courses (NS 4000, 4010, 4020) can be used to obtain credit for more diverse or intensive experience than the classroom can offer, whether this involves laboratory work, library research, or field study. Any student interested in independent study should obtain the sponsorship of a faculty advisor and the approval of the director of undergraduate studies or consider applying to the honors program.

HONORS PROGRAM

The honors program, which leads to a B.S. degree with honors in the College of Human Ecology or a B.S. degree with distinction in research in the College of Agriculture and Life Sciences, gives official recognition to students who have demonstrated excellence in their academic work and their capacity for independent study.

In addition to fulfilling the requirements for a major, students in the honors program take seminars in designing and evaluating research (NS 3980), complete an original piece of research (at least 6 credits of NS 4990), and prepare an honors thesis. The honors project may be laboratory or field research or deal with policy and program development. For more information, students should contact Professor J. Thomas Brenna, B38 Savage Hall.

COURSES RECOMMENDED FOR NONMAJORS

Courses in nutritional sciences can strengthen programs of study in biological sciences, biology and society, communications, food science, human development, human services, and other fields.

NS 1150 Nutrition, Health, and Society is open to all students. After NS 1150, nonmajors with limited backgrounds in chemistry and biology may elect NS 2450 Social Science Perspectives on Food and Nutrition; NS 2470 Food for Contemporary Living; NS 2750 Human Biology and Evolution; NS 3060 Nutritional Problems of Developing Nations; NS 3150 Obesity and the Regulation of Body Weight; NS 3470 Human Growth and Development: Biological and Behavioral Interactions; NS 4500 Public Health Nutrition. Nonmajors with strong backgrounds in chemistry and the biological sciences may consider NS 3310 Physiological and Biochemical Bases of Human Nutrition, as well as many advanced nutritional sciences courses, such as NS 3450 Introduction to Physicochemical and Biological Aspects of Foods; NS 4310 Mineral Nutrition and Chronic Disease; and NS 4410 Nutrition and Disease.

GRADUATE PROGRAMS

Graduate study is administered by the field of nutrition, a group of about 40 faculty members from throughout the university who have a common interest in nutritional problems. In the M.S./Ph.D. and Ph.D. degree programs, students may specialize in molecular and biochemical nutrition, human or animal nutrition, community nutrition, or international nutrition. Research is emphasized in all graduate programs. Field experience may be an important component of concentrations in community, international, and public health nutrition and nutrition education. Teaching experience and participation in the graduate student seminar (NS 7030) are important aspects of graduate training.

The specialties and interests represented by faculty in the field of nutrition provide almost unlimited opportunity for graduate study. Cornell's extensive laboratory and agricultural facilities ensure that students interested in experimental nutrition have exceptional choices and thorough training. As the largest faculty in the country devoted to the study of human nutrition, the field includes specialists in biochemical, metabolic, epidemiological, and sociocultural research. Opportunities to work with community and federal agencies are available to students interested in applied nutrition and public policy. Students in international nutrition are expected to conduct their thesis research abroad.

For more information about the graduate program, students should visit the web site or contact the director of graduate studies, field of nutrition, Cornell University, B19 Savage Hall, Ithaca, NY 14853-4401, 255-2628, nutrition_gfr@cornell.edu, or www.nutrition.cornell.edu/grad.html.

COURSES

NS 1150 Nutrition, Health, and Society

Fall. 3 credits. S–U or letter grades.

Evening prelim. D. Levitsky.

Discusses the facts and fallacies concerning the role that nutrition, exercise, and other health behaviors play in preventing disease, maintaining good health, and maximizing athletic performance. Emphasis is on understanding the biological mechanisms through which good nutrition and regular exercise affect psychological and physical health.

NS 1160 Personalized Concepts and Controversies

Fall. 1 credit. Limited enrollment.

Prerequisite: freshman or transfer standing.

Corequisite: NS 1150. S–U grades only.

J. Swanson.

Provides students enrolled in NS 1150 individualized assistance in many skills including using computers to analyze diets, finding and using scientific references, understanding and criticizing scientific articles, and reviewing material presented in lectures.

NS 1200 Nutrition and Health: Issues, Outlooks, and Opportunities

Spring. 1 credit. Prerequisite: freshman, sophomore, or junior standing or permission of instructor. *Not* an introductory nutrition course for nonmajors. S–U grades only. C. You.

For students interested in exploring careers in the broad fields of food, nutrition, and health. Experts representing different areas discuss their work, focusing on current issues and trends as well as the requisite knowledge and skills. This course introduces many of the disciplines that are drawn upon in addressing human problems related to food, diet, and health. Students explore career opportunities through a variety of assignments.

NS 1200 Nutrition and the Life Cycle

Spring. 3 credits. Prerequisite: one semester college biology or NS 1150. Letter grades only. P. Brannon.

Biology of the life cycle including development, growth, maturation, and aging and its impact on nutritional requirements of humans from the zygote to the elderly is considered. How to meet these nutritional requirements is discussed relative to the feeding issues and context of each major life stage. Course emphasizes the critical analyses of beneficial and adverse outcomes of various nutrient intakes and dietary patterns on the nutritional status and well-being through integration of nutrition and other health sciences in understanding nutritional needs during the life cycle.

NS 2450 Social Science Perspectives on Food and Nutrition

Fall. 3 credits. Limited enrollment. Must be enrolled by third class meeting.

Prerequisite: NS 1150. S–U or letter grades. C. Bisogni and J. Sobal.

Uses theories, concepts, and methods from the social sciences to examine food, eating, and nutrition. The food choice process model is used as a framework for examining the scope of social science aspects of nutrition. Assignments include examinations, short papers, and two research projects, one qualitative and one quantitative, for which students prepare proposals, collect and interpret data, and write papers to report data.

NS 2470 Food for Contemporary Living

Fall and spring. 2 credits. Limited enrollment. Priority given to Dietetics students. Highly recommended: NS 1150. Students must attend first lab or placement is forfeited. S–U or letter grades. Lab coat required. E. Gier.

During this laboratory course, the understanding of food ingredients and techniques of food preparation is applied to positive nutritional practices and health promotion goals; basic food science and nutrition principles, food safety/sanitation, sensory evaluation, and social-cultural influences on food choices; food preparation, recipe modification, sensory evaluation (taste testing required); basic cooking skills, techniques. Introduction to basic menu planning and meeting nutritional requirements while restricted to a budget. Lab performance and a lab practical factored into final student evaluation; attendance at all labs is expected.

NS 2600 Introduction to Global Health

Spring. 3 credits. Limited enrollment. Letter grades only. Evening prelim. R. Stoltzfus and J. Moseley.

Explore contemporary issues, problems, and controversies in global health through an interdisciplinary perspective. Introduces the global burden of disease and then examines complex social, economic, political, environmental, and biological factors that structure the origins, consequences, and possible treatments of global health problems. A limited number of problems are explored in depth (e.g., HIV, maternal mortality, malaria).

NS 2750 Human Biology and Evolution (also ANTHR 2750)

Fall. 3 credits. Prerequisite: college biology. S–U or letter grades. J. D. Haas and Z. Gu.

Examines the theories and mechanisms of modern evolutionary biology as they apply to present-day humans and their hominid ancestors. Includes lectures and discussions of molecular and paleontological evidence of human evolution, the causes and consequences of contemporary human biological diversity, and biological and behavioral modes of human adaptation to past and present natural and cultural environments.

NS 3000 Special Studies for Undergraduates

Fall or spring. Prerequisite: permission of instructor. S–U or letter grades. DNS faculty. Special arrangements can be made to establish equivalency for courses not transferred from a previous major or institution. Students prepare a description of the study they want to undertake using a form available from the college registrar's office. The form, signed by both the instructor directing the study and the associate director for academic affairs, is filed at course registration or during the change-of-registration period.

NS 3060 Nutritional Problems of Developing Nations

Fall. 3 credits. Prerequisite: NS 1150. S–U or letter grades. Offered alternate years. R. Stoltzfus.

Overview of the most important nutrition problems facing developing countries today and an in-depth understanding of the nutrition problems of one country, chosen as a case study for the course. Course uses the health/care/food framework to analyze the causes of these nutrition problems. Instruction is through lectures and readings. Evaluation is

through individual assignments, a group project, and exams.

NS 3150 Obesity and the Regulation of Body Weight (also PSYCH 3150)

Spring. 3 credits. Prerequisites: junior or senior standing; NS 1150, PSYCH 1101.

S–U or letter grades. Offered alternate years. D. Levitsky.

Multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include the biopsychology of eating behavior, the genetics of obesity, the role of activity and energy metabolism, the psychosocial determinants of obesity, anorexia nervosa, therapy and its effectiveness, and social discrimination.

NS 3200 Introduction to Human Biochemistry

Fall. 4 credits. Prerequisites: one year college biology; one year college general chemistry; and CHEM 1570 or 3570–3580; or permission of instructor. S–U or letter grades. P. Stover and S. B. Qian.

Presents the principles of biochemistry within the context of human health and disease. Teaches the metabolism of carbohydrates, lipids, proteins, and selected micronutrients from a perspective that emphasizes their role in supporting the structure and physiological functions of the major organs of the body. Incorporates the concepts of enzyme catalysis, enzyme regulation, hormone action, and bioenergetics within this framework. Covers the fundamental concepts of eukaryotic DNA structure, function, and gene expression with reference to their importance in regulating metabolism and the impact of a changing nutrient environment.

[NS 3220 Maternal and Child Nutrition

Spring. 3 credits. Limited enrollment.

Prerequisite: NS 1220 or permission of instructor. S–U or letter grades. Offered alternate years; next offered 2010–2011. P. Brannon.

Critical analyses of the nutritional requirements and impact of nutritional status on the mother, fetus, and young child from global and domestic perspectives.]

NS 3310 Physiological and Biochemical Bases of Human Nutrition

Spring. 4 credits. Prerequisites: BIOBM 3300 or 3310, or NS 3200, or equivalent. S–U or letter grades. C. McCormick and L. Qi.

Examines the biochemical and physiological bases of human nutritional requirements. Uses an integrated approach to cover the digestion and metabolism of nutrients (carbohydrates, proteins, lipids, vitamins, and minerals). Metabolic and chronic diseases related to nutrition are discussed throughout the semester. Discussion sections and problem sets provide an opportunity to examine in greater depth selected topics from lecture.

NS 3320 Methods in Nutritional Sciences

Fall. 3 credits. Prerequisites: undergraduate biochemistry; NS 3450, NS 3310 preferred or concurrent registration. Letter grades only. M. N. Kazarinoff.

Laboratory introduction to principles and analytical techniques of nutritional research. Emphasizes analytical concepts and skills required to determine nutrient function and nutritional status of individuals. Topics include methods of nutrient, metabolite, and enzyme analysis in body fluids; methods for assessing individual food intake and nutritional status; and methods for assessing the composition of foods.

NS 3410 Human Anatomy and Physiology

Spring, 3 credits. Prerequisite: college biology. Priority given to DNS majors. Letter grades only. K. O'Brien.

Introduces human anatomy and physiology by detailing the structure and function of the human body and mechanisms used to maintain homeostasis. Emphasis is given to aspects relevant to the nutritional sciences and medicine. Content includes language of anatomy, cells, tissue, integumentary, respiratory, skeletal, muscular, digestive, nervous, cardiovascular, urinary, and reproductive systems. Clinical examples are provided to highlight perturbations and physiology of topics discussed. Evaluation is based on attendance, iclicker-based class interaction, weekly quizzes, and a midterm and final.

NS 3420 Human Anatomy and Physiology Laboratory

Spring, 2 credits. Corequisite: NS 3410. Priority given to DNS majors. Students registered for lab course who are more than 10 minutes late for first meeting forfeit registration; no admittance after second week. M. Lujan.

Principles of anatomy and physiology will be presented using models of the human body, organs, skeleton, and muscles as well as interactive noninvasive assessment techniques of physiological functions. Weekly lecture will provide content connections with NS 3410 and a discussion format. Emphasis will be on location, recognition, and description of anatomical structure and relation to function. Content includes human body orientation and language of anatomy, histology, and various body systems. Evaluation based on attendance, two lab practicums, and lab written assignments.

NS 3450 Introduction to Physicochemical and Biological Aspects of Foods (also FDSC 2000)

Fall, 3 credits. Prerequisites: college-level courses in chemistry and biology. Letter grades only. R. Parker and J. Hotchkiss. For description, see FDSC 2000.

[NS 3470 Human Growth and Development: Biological and Behavioral Interactions (also HD 3470, BSOC 3471)]

Spring, 3 credits. Prerequisites: BIOG 1101 or 1109 or equivalent; HD 1150 or PSYCH 1101 or equivalent. S-U or letter grades. Offered alternate years; next offered 2010-2011. J. Haas and S. Robertson.

Discusses the interrelationships of physical and psychological growth and development in humans during infancy. Considers its variations for behavioral, psychological, and physical development.]

NS 3500 Epidemiology in Context

Spring, 3 credits. Prerequisite: introductory statistics (e.g., PAM 2100, AEM 2100, ILRST 2100). Letter grades only. D. Pelletier.

Provides the conceptual tools to critically analyze the controversies related to a wide range of contemporary health and social issues in the United States and global context. Basic principles of epidemiology are illustrated via case studies of nutritional and biomedical interventions, environmental toxins, and social issues.

NS 3980 Research in Human Nutrition and Health

Fall, 1 credit. Requirement for students in honors research program sponsored by DNS. Open to all students. S-U grades only. J. T. Brenna.

Lecture course focusing on the structures and practice of professional research conducted in human nutrition and health, a field that encompasses questions ranging widely from subcellular components to population-level issues. Introduces the various approaches and methods used by researchers and addresses the topics of ethics and research controls. Describes the structure of scientific literature, preparation of research proposals, roles of scientific organizations, and funding sources. Students are required to attend and report on research seminars on campus.

NS 4000-4010-4020-4030 Special Studies for Undergraduates

Fall or spring. Variable to 3 credits. S-U grades only for NS 4000-4010-4020; after completing 2 credits S-U with final grade of S for NS 4000-4010-4020, grading option may be S-U or letter for NS 4000-4010-4020; S-U or letter grades for NS 4030. DNS faculty.

For advanced independent study by an individual or group of students who want to study a field of nutritional sciences not otherwise provided through course work in the division or elsewhere in the university. Students prepare a description of the study they want to undertake on a form to be signed by the instructor directing the study and the student's faculty advisor. The form, available in B21 Savage Hall or in the Human Ecology registrar's office, is filed at course registration or within the change-of-registration period. To ensure review before the close of the course registration or change-of-registration period, students should submit the special-studies form to B21 Savage Hall as early as possible.

NS 4000 Directed Readings

S-U grades only; after completing 2 credits S-U with a final grade of S for NS 4000, grading option may be S-U or letter.

Study that predominantly involves library research and independent reading.

NS 4010 Empirical Research

S-U grades only; after completing 2 credits S-U with a final grade of S for NS 4010, grading option may be S-U or letter.

Study that predominantly involves data collection and analysis or laboratory or studio projects.

NS 4020 Supervised Fieldwork

S-U grades only; after completing 2 credits S-U with a final grade of S for NS 4020, grading option may be S-U or letter.

Study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

NS 4030 Teaching Apprenticeship

S-U or letter grades.

Study that includes assisting faculty with instruction.

NS 4130 Nutritional Genomics—Evolution and Environment

Spring, 2 credits. Prerequisites: senior or graduate standing, BIOGD 2810 or permission of instructor. S-U or letter grades. Z. Gu.

Examines selected topics related to nutrition and genome biology. Discussion of nutrition and human evolution, such as human brain evolution, evolution of taste, population variation related with nutrition, and evolution of human diseases. Reading materials are from literature and participation in class discussion is required.

[NS 4210 Nutrition and Exercise]**NS 4250 Nutrition Communications and Counseling**

Spring, 3 credits. Limited enrollment. Prerequisites: NS 1150, 1220, and 2450; junior or senior standing; priority given to dietetics/nutrition majors. Letter grades only. S. Travis.

Students learn the theoretical basis of effective health promotion communications and develop effective nutrition communication skills through application in a variety of settings. Provides hands-on experiences in counseling, educational program development, and oral and written communications.

NS 4310 Mineral Nutrition and Chronic Disease

Fall, 3 credits. NS 3310 preferred. S-U or letter grades. C. McCormick.

Evaluate the evidence from primary literature that dietary calcium, sodium, and iron play an important role in the development of osteoporosis, hypertension, and anemia, respectively. An additional goal of the course is to review the molecular processes that are involved in the homeostasis of each mineral and the recommendations for daily nutrient intakes. Class discussion of key research articles is conducted and evaluated.

NS 4410 Nutrition and Disease

Fall, spring, 4 credits. Prerequisites: NS 3310 and physiology course. S-U or letter grades. Fall, M. Caudill.

Principles of nutrition, biochemistry, physiology, genetics, and pathology are combined to understand disease risk, prevention, progression, and management. Topics include nutritional genomics, obesity, cardiovascular disease, cancer, diabetes mellitus, trauma, and renal, neurological, liver, skeletal, and gastrointestinal disorders.

NS 4420 Implementation of Nutrition Care

Fall, 3 credits. Pre- or corequisites: NS 1150, NS 1220, NS 2470, NS 4410, or concurrent registration or equivalent background in courses. S-U or letter grades. Evening prelim. E. Gier.

Develop skills necessary to implement nutrition care. Application of the nutrition care process as it applies to clinical settings is emphasized. Students develop skills to perform nutrition assessment, nutrition diagnosis, nutrition intervention, monitoring, and evaluation. Content includes principles of MNT for acute and chronic diseases, menu planning for disease states, the role of other allied health practitioners in assuring nutritional health, and reimbursement and legislation in dietetics practice.

NS 4450 Toward a Sustainable Global Food System: Food Policy for Developing Countries (also AEM 4450)

Fall, 3 credits. Preferred: 6 credits in economics, applied economics, or sociology and 6 credits in nutrition and/or agricultural sciences. Letter grades only. P. Pinstrup-Andersen.

Comprehensive presentation and discussion of policy options for a sustainable global food system, with focus on developing countries. Topics include economic policy related to nutrition, health, consumption, production, natural resource management, trade, markets, gender roles, armed conflict, and ethics. A social entrepreneurship approach bases on case studies and active participation by students will be used.

NS 4500 Public Health Nutrition

Spring. 2 credits. Prerequisite: NS 1150. Students must attend first lec or placement is forfeited. Letter grades only. Evening prelim. K. Rasmussen.

Public health nutrition is the major professional career track for nutritionists outside of dietetics. It deals with efforts to improve the diets and nutritional status of whole populations by working at the community, state, and national levels. Course helps prepare students to work in public health nutrition by describing methods used in the assessment of nutrition problems, the development of nutrition-related policies, and the delivery of health, nutrition, and food assistance programs.

NS 4550 Actors and Interests in Global Health (also GOVT 4558)

Fall, spring. 3 credits. Offered at Cornell-in-Washington program only. Letter grades only. D. Pelletier.

Explores the perspectives and interests of a range of organizations involved in global health; their roles and activities; the complications for agenda-setting, policy development, and implementation arising from this diversity of actors; and the opportunities and challenges for greater harmonization at national and international levels. The course includes readings, student-driven discussions, guest speakers from the D.C. area, student presentations, and student portfolios.

NS 4570 Health, Poverty, and Inequality: A Global Perspective (also ECON 4740)

Fall. 3 credits. Prerequisite: introductory microeconomics and statistics or permission of instructor. S–U or letter grades. Offered alternate years. D. Sahn.

Course focuses on global health challenges, and how they are related to poverty and inequality.

NS 4600 Explorations in Global Health

Spring. 3 credits. Prerequisite: junior or senior standing with completion of all requirements for global health minor, or permission of instructor. Letter grades only. D. Pelletier.

Capstone course for global health minors assists students to explore their topical interests in global health and integrate these with their field experiences, core knowledge in global health, and personal values and ethical frameworks. Course content is driven largely by student topical interests and experiences, and selected guest speakers. Explorations are done through individual work, team projects, and classroom discussions.

NS 4620 Seminar in Global Health and Development Issues: Tanzania

Spring. 1 credit. Restricted to students in the Global Health and IARD Summer Session and Internship Program in Tanzania. S–U grades only. J. Moseley and L. Harrington.

Seminar prepares students for the Global Health and IARD Summer Session and Internship Program in Tanzania during the summer. Students hear from Cornell faculty and other speakers on global health, agriculture, and development issues relevant to Tanzania. Course sessions also cover Tanzanian history, culture, language, and politics. Students will be actively engaged in reading, discussing, and presenting on key seminar topics.

NS 4630 Global Health, Development and Policy Issues in Tanzania

Summer. 4 credits. Prerequisite: NS 4620. Restricted to students in the Global Health and IARD Summer Session and Internship Program in Tanzania. Letter grades only. R. Stoltzfus.

Engages Global Health minors, IARD majors, and Tanzanian medical students in problem-based learning in a cross-cultural small group context in Tanzania. Develop and justify policy recommendations to address a current issue related to global health, nutrition, food safety, or agriculture. Students will work in assigned teams of three to four, designed to mix Cornell and Tanzanian students.

[NS 4750 Mechanisms Underlying Mammalian Developmental Defects (also BIOAP 4750)]

Spring. 3 credits. Prerequisites: BIOBM 3300, 3310–3320 or 3330 (may be taken concurrently). Offered alternate years. D. Noden and P. Stover.

For description, see BIOAP 4750.]

NS 4880 Applied Dietetics in Food Service Systems

Spring. 3 credits. Limited to Dietetics seniors. Prerequisites: HADM 1106 or intro food service management course, NS 2470, and BIOMI 2900. White lab coat required. Fee for special supplies/training and activities: approx. \$110. E. Gier.

Gain experience in facility design; equipment selection, use, and care; job analysis and evaluation; human resources planning; management of financial resources; recipe development and volume food production; computer-assisted management; employee training; and applied safety and sanitation standards. Through planning and executing a themed event, students develop skills required to operate/manage a food service program. Application of quality management in food service operations and facility management is stressed. Laboratories are arranged through Cornell Dining and other off-campus sites. Completion of a professional portfolio is required. ServSafe training and examination is conducted; successful completion results in ServSafe certification.

NS 4900 Manipulating the Mouse Genome (also BIOGD 4900)

Fall. 1 credit. Meets during first half of semester and provides background information for VTBMS/TOX 7010 Mouse Pathology and Transgenesis, which meets during second half. Students interested in both must register for them separately. Prerequisites: BIOGD 2800, 2810, or 2820 and BIOBM 3300, 3320 or 3330, or NS 3200. S–U or letter grades. P. Soloway.

Functional genomic analysis has benefited enormously from experimental manipulation of the genomes of many organisms. The mouse has been the model of choice for such studies in mammals. Explores the tools available for experimental manipulation of the mouse

genome, including transgenesis, gene targeting, gene trapping, chemical mutagenesis, and cloning by nuclear transplant. Also discussed are use of recombinant inbred mice for complex trait analysis. Readings from the scientific literature focus on seminal applications of these methods.

NS 4990 Honors Problem

Fall and spring. Credit TBA. Prerequisite: acceptance into honors research program. Students who have been accepted into the honors research program work on their projects under the guidance of their faculty mentors. Honors research students must complete a minimum of 6 credits of NS 4990, typically spread over two or more semesters. The student and the mentor determine the appropriate number of credits for each semester. Research activities may include reviewing the literature, writing a proposal, developing research methods, collecting data in the field or laboratory, analyzing data, and writing the honors thesis.

NS 6000 Special Problems for Graduate Students

Fall or spring. Credit TBA. Prerequisite: graduate students recommended by their chair and approved by instructor in charge. S–U or letter grades. DNS faculty. Emphasizes independent advanced work. Experience in research laboratories in the division may be arranged.

NS 6030 Mineral Nutrition: Metabolic, Health, and Environmental Aspects (also ANSC 6030)

Fall. 2 credits. Prerequisites: biochemistry, physiology, and nutrition courses. Letter grades only. Offered alternate years. X. G. Lei and C. C. McCormick. For description, see ANSC 6030.

NS 6050 Molecular and Human Nutrition

Fall and spring. 1 credit. S–U grades only. Molecular nutrition faculty. Graduate seminar series that focuses on recent advances in molecular nutrition. Weekly presentations are made by faculty members, postdocs, and graduate students and are based on the primary literature. The presentations are followed by a discussion involving all participants.

NS 6080 Epigenetics (also BIOGD 6080)

Fall. 2 credits. Prerequisites: BIOGD 2810 and BIOBM 3300, 3320, or 3330 or NS 3200. Letter grades only. P. Soloway. Epigenetic effects refer to reversible alterations in chromatin structure that can stably and heritably influence gene expression. Changes include covalent modifications to DNA itself or to proteins bound to DNA as well as noncovalent remodeling of chromatin. Course examines selected epigenetic phenomena described in several eukaryotes, mechanisms regulating these effects, and their phenotypic consequences when normal regulation is lost. Reading materials are from current literature, and participation in class discussion is required.

[NS 6100 Proteins and Amino Acids: Nutritional Regulation of Mammalian Protein Synthesis and Degradation

Fall. 2 credits. Letter grades only. Offered alternate years; next offered 2010–2011. M. Stipanuk. Basic biochemistry and cell biology related to processes involved in protein synthesis and degradation and the regulation of these

processes. Scientific literature will be used to provide examples of regulation of each of these processes, selected for their relevance to human nutrition and metabolism.]

[NS 6110 Molecular Toxicology (also TOX 6110)

Spring, 3 credits. S-U letter grades. Offered alternate years; next offered 2010-2011. S. Bloom and B. Strupp.

Focuses on metabolism of drugs and environmental chemicals to toxic and mutagenic products and how they can induce developmental and reproductive alterations or carcinogenesis. Signaling pathways that regulate cellular responses to toxicant exposure are discussed. Also emphasizes molecular markers useful for assessment of human exposure to chemicals and radiation.]

NS 6140 Topics in Maternal and Child Nutrition

Fall, 3 credits. Prerequisite: permission of instructor. Letter grades only. K. Rasmussen. Advanced course on the role of nutrition during pregnancy and lactation. The feeding and growth of infants and children in health and disease is considered. Critical evaluation of current literature is emphasized via lecture, discussions, and a term paper.

NS 6170 Teaching Seminar

Fall or spring, 0 credits. Prerequisite: DNS graduate students or permission of instructor. S-U grades only. C. You and D. Way. Individualized instruction focusing on development of teaching skills for guiding learning in lecture, discussion, and laboratory setting, and reflection on the impact of these skills on teaching and learning. Students identify the aspects of the specific teaching assignments they wish to develop and work with instructors on independent learning projects that may include preparation for lecturing, preparation of exams, efficient grading, and so on. Optional videotaping provides opportunities for practice and analysis.

NS 6180 Teaching Experience

Fall or spring, 0 credits. Prerequisite: DNS graduate students or permission of instructor. S-U grades only. C. You. Designed to provide experience in teaching nutritional sciences by direct involvement in college courses under supervision of a faculty member. The aspects of teaching and the degree of involvement vary, depending on the needs of the course and the experience of the student.

NS 6190 Field of Nutrition Seminar (also ANSC 6190)

Fall or spring, 0 credits. S-U grades only. Faculty and guest lecturers. Lectures on current research in nutrition.

NS 6250 Community Nutrition in Action

Fall, 3 credits. Prerequisite: dietetic interns. Letter grades only. Staff. Provides students enrolled as dietetic interns with supervised, in-depth experiences in a community nutrition program and fosters the integration of research, theory, and practice. Through placements in community programs, students gain experience in program administration and in assessing, designing, implementing, and evaluating food and nutrition programs for targeted populations through public and private organizations. In weekly seminars (and other seminars and observations as arranged) students integrate theory and practice, reflect upon their

placement experience, learn about community nutrition research, and explore the many issues facing community food and nutrition practitioners.

NS 6300 Anthropometric Assessment

Spring, five weeks. 1 credit. Prerequisite: NS 3310 or equivalent and permission of instructor. S-U or letter grades. Offered alternate years. J. Haas.

Topics in this lecture/lab course include biological basis of anthropometry for nutritional status assessment, quality control of anthropometric data, applications to special groups (infants, children, adolescents, pregnant women, and the elderly), statistical analysis and presentation of anthropometric data, reference standards and interpretation, measurement techniques of anthropometry, and body composition assessment.

NS 6310 Micronutrients: Function, Homeostasis, and Assessment

Fall, 2-4 credits. Prerequisites: intro biochemistry and NS 3310 (or equivalent) or permission of instructor. S-U or letter grades. C. McCormick, M. Caudill, K. O'Brien, and R. Parker.

Advanced course in nutrition that focuses on the function, homeostasis, and metabolism of the principal dietary micronutrients (vitamins and minerals). It expands on the principles of nutritional biochemistry provided in introductory courses. One goal is to provide the scientific basis and rationale for recommended Dietary Reference Intakes. The course will draw on primary literature of both past and contemporary research. This course is divided into two parts: minerals and vitamins (each for 2 credits) during the first and second 7-week periods, respectively.

NS 6320 Regulation of Macronutrient Metabolism

Spring, 4 credits. Prerequisite: NS 3310 or permission of instructor. S-U or letter grades. M. Stipanuk, P. Brannon, L. Qi, P. Soloway, T. Brenna, and R. Parker.

Course provides a comprehensive overview of macronutrient metabolism with an emphasis on issues relevant to human nutrition. Topics include regulation of macronutrient utilization by various tissues in response to food intake, energy stores, and energy expenditure; cellular pathways for integration of nutrient, growth, and stress signals; biological regulation of food intake and energy expenditure; the regulation of utilization of macronutrients for growth; dietary reference intakes for macronutrients; specialized functions of essential amino acids and essential fatty acids; lipoprotein and cholesterol metabolism; and the regulation, or dysregulation, of macronutrient utilization in various disease/physiological states.

NS 6350 Introduction to Community Nutrition Research for Dietetic Interns

Fall, 3 credits. Prerequisites: graduate standing and permission of instructor. Letter grades only. Staff.

Introduces the paradigms, concepts, methods, and issues involved in community nutrition research. Students design and conduct individual research projects to inform community nutrition programs. Lectures, readings, and class discussion support students as they conduct their research activities.

NS 6370 Epidemiology of Nutrition

Spring, 3 credits. Prerequisites: graduate standing; BTRY 6010 and concurrent registration in BTRY 6020 or equivalent knowledge; basic knowledge of nutritional aspects of growth and development and nutritional biochemistry. S-U or letter grades. Staff.

Covers principles of nutritional epidemiology, impact assessment of nutrition intervention programs, and nutritional surveillance. Presents principles of using nutritional information in decision making. Shows how the biochemistry and physiology of nutrition can be related to epidemiological assessment and research strategies.

NS 6380 Epidemiology of Nutrition Seminar

Spring, 3 credits. Prerequisites: graduate students planning field intervention studies; permission of instructor; NS 6370. Covers the meta-analysis, design, measurement, and analytic issues involved in developing, implementing, and analyzing studies of field interventions with nutritional impact.

NS 6400 Social Science Theories in Nutrition

Fall, 3 credits. Limited enrollment. Prerequisite: graduate standing. Letter grades only. J. Sobal. Social science theories from sociology, psychology, anthropology, economics, political science, geography, and history that contribute to understanding food, eating, and nutrition are discussed to understand how paradigms, theories, and models apply to nutrition topics, issues, and problems.

NS 6420 Globalization, Food Security, and Nutrition (also AEM 6420)

Fall, 2 credits. Prerequisites: permission of instructor, graduate standing, and basic understanding of economics and nutrition. Letter grades only. P. Pinstrup-Andersen. Directed readings course with a weekly 50-minute discussion session. Course is aimed at graduate students in nutrition, agricultural economics, and other relevant fields, who wish to explore how globalization may affect poverty, food security, and nutrition in developing countries and how national policies and international agreements and institutions may influence the outcome. Discussion sessions are based on assigned readings for each week.

NS 6440 Community Nutrition Seminar

Fall and spring, 1 credit. S-U grades only. A. Gillespie. Sponsored by the Cornell Community Nutrition Program. Graduate students and faculty learn about current research in the program and related fields within and outside Cornell and about community nutrition theories and research methodologies. The seminar also provides a forum to discuss participants' own research and current issues in community nutrition.

NS 6520 The Foundations of Epidemiology

Spring, 3 credits. Prerequisite: BTRY 6010 or equivalent. Letter grades only. P. A. Cassano. Intent is to train students to conduct epidemiologic research of the highest quality. Through lectures and in-class discussion, students also will learn how to evaluate research conducted by others, and how to apply epidemiologic principles to study the

role of nutrition in health, the outcomes of treatment in clinical medicine, and the evaluation of health services.

NS 6600 Special Topics in Nutrition

Fall or spring. 3 credits max. each semester; because topics change, may be repeated for credit. Prerequisite: graduate standing and permission of instructor. DNS faculty.

Designed for students who want to become informed in any specific topic related directly or indirectly to nutrition. The course may include individual tutorial study, experience in research laboratories, a lecture series on a special topic selected by a professor or a group of students, and/or selected lectures of another course already offered.

[NS 6800 International Nutrition Problems, Policy, and Programs

Spring. 3 credits. Prerequisite: permission of instructor. TBA. Offered alternate years. Staff.

Designed for graduate students who want to learn about the important nutritional problems of developing countries. The major forms of malnutrition related to poverty and their underlying causes are discussed. Emphasis is placed on programs and policies that can help poor countries and communities improve their nutritional and health status.]

[NS 6850 Empirical Methods for the Analysis of Household Survey Data: Applications to Nutrition, Health, and Poverty (also ECON 7711)

Spring. 4 credits. Prerequisites: intermediate microeconomics, intermediate statistics or econometrics (through multiple regression and limited dependent variable models), or permission of instructor. Offered alternate years; next offered 2010–2011. D. Sahn.

Advanced seminar explores recent empirical research and evaluation literature on issues of health, nutrition, education and intra-household decision-making in developing countries.]

[NS 6900 Trace Element and Isotopic Analysis (also CHEM 6280)

Fall. 3 credits. Prerequisite: CHEM 2880 or 3900, 3020 or CHEM 2080 and MATH 1120, or permission of instructor. Primarily for graduate students and advanced undergraduates. S–U or letter grades. Offered alternate years; next offered 2010–2011. J. T. Brenna.

Survey course in modern high-precision isotope ratio mass spectrometry (IRMS) techniques and trace/surface methods of analysis. Topics include dual inlet and continuous flow IRMS, elemental MS, atomic, X-ray, and electron spectroscopies, ion and electron microscopies, and biological and solid state applications.]

NS 6980 International Nutrition Seminar

Fall and spring. 0 credits. No grades given. Staff.

Consists of presentations by Cornell faculty and graduate students and invited outside speakers. Speakers cover a range of topics relating to nutritional problems, policy, and programs in nonindustrialized countries.

NS 6990 Special Topics in International Nutrition

Fall and spring. 3 credits max. each semester; because topics change, may be repeated for credit. Prerequisite: permission of instructor. Staff.

Designed for graduate students, mainly those with a concentration in international nutrition, who wish to become familiar with some specific topic related to international nutrition that is not adequately covered in an existing course. It consists of tutorial study on an agreed-upon topic.

NS 7020 Seminar in Toxicology (also TOX 7020)

Fall or spring. 1 credit. S–U grades only. Staff.

Covers varied topics in biochemical, genetic, nutritional, veterinary, and regulatory toxicology, ecotoxicology, and environmental chemistry. Includes presentations of basic research studies, fundamental concepts, and research activities involving environmental problems of a toxicological nature. Presentations are given by speakers from Cornell and visitors.

NS 7030 Seminar in Nutritional Sciences

Fall and spring. 1 credit. Prerequisite: for undergraduates, permission of instructor. S–U grades only. Staff.

Presentations of original articles pertinent to the nutritional sciences. Students read and learn how to critically analyze and interpret original articles published in a wide variety of journals. Students learn how to make professional presentations and how to critique the presentations given by others.

NS 7040 Grant Writing

Spring. 2 credits. Prerequisite: NS 7030. S–U grades only. P. Stover.

Interactive course that addresses the knowledge, approach, and professional skills (conceptual, technical, and writing) required to create a successful grant proposal and initiate a career in research. Format is focused around the development, execution, and evaluation of NIH–style grant proposals. Lectures will focus on the development of hypotheses, specific aims, and long term goals, as well as research design and methodology. Issues of human subject and animal experimentation, ethics, and research collaborators are also covered. Students are expected to develop a full-length grant proposal in consultation with their research advisor. Basic guidelines and approach to proposal evaluation and scoring are covered. Course concludes with a mock study section where all proposals are reviewed by the students.

NS 8990 Master's Thesis and Research

Fall or spring. Credit TBA. Prerequisite: permission of graduate committee chair and instructor. S–U or letter grades. DNS graduate faculty.

NS 9990 Doctoral Thesis and Research

Fall or spring. Credit TBA. Prerequisite: permission of graduate committee chair and instructor. S–U or letter grades. DNS graduate faculty.

FACULTY ROSTER

Bensadoun, Andre, Ph.D., Cornell U. Prof., Nutritional Sciences/Physiology, Emeritus
Bisogni, Carole, Ph.D., Cornell U. Prof.
Brannon, Patsy, Ph.D., Cornell U. Prof.
Brenna, J. Thomas, Ph.D., Cornell U. Prof.
Campbell, T. Colin, Ph.D., Cornell U. Jacob Gould Schurman Emeritus Professor of Nutritional Biochemistry

Cassano, Patricia, Ph.D., U. of Washington. Assoc. Prof.
Caudill, Marie, Ph.D., U. of Florida. Assoc. Prof.
Devine, Carol M., Ph.D., Cornell U. Prof.
Dollahite, Jamie, Ph.D., U. of Texas. Assoc. Prof. and EFNEP Leader
Gillespie, Ardyth, Ph.D., Iowa State U. Assoc. Prof.
Gu, Zhenglong, Ph.D., U. of Chicago. Asst. Prof.
Haas, Jere D., Ph.D., Pennsylvania State U. Nancy Schlegel Meinig Professor in Maternal and Child Nutrition
Habicht, Jean-Pierre, Ph.D., Massachusetts Inst. of Technology. James Jamison Professor of Nutritional Epidemiology, Emeritus
Kazarinoff, Michael N., Ph.D., Cornell U. Assoc. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
Latham, Michael, M.D., Harvard U. Prof. Emeritus, Nutritional Sciences
Levitsky, David A., Ph.D., Rutgers U. Prof.
Lujan, Marla, Ph.D., Queen's U. (Canada). Asst. Prof.
McCormick, Charles, Ph.D., North Carolina State U. Assoc. Prof. and Dir., Graduate and Undergraduate Studies
McDermid, Joann, Ph.D., U. of London (U.K.). Asst. Prof.
O'Brien, Kimberly, Ph.D., U. of Connecticut. Assoc. Prof.
Olson, Christine M., Ph.D., U. of Wisconsin. Prof.
Parker, Robert S., Ph.D., Oregon State U. Assoc. Prof.
Pearson, Thomas, Ph.D., Johns Hopkins U. Adjunct Prof.
Pelletier, David, Ph.D., Pennsylvania State U. Assoc. Prof.
Pelto, Gretel, Ph.D., U. of Minnesota. Prof.
Pinstrup-Andersen, Per, Ph.D., Oklahoma State U. H. E. Babcock Professor of Food, Nutrition, and Public Policy
Qi, Ling, Ph.D., U. of Maryland. Asst. Prof.
Qian, Shu-Bing, Ph.D., Shanghai Jiaotong U. (People's Republic of China). Asst. Prof.
Rasmussen, Kathleen M., Sc.D., Harvard U. Prof.
Sahn, David, Ph.D., Massachusetts Inst. of Technology. Prof.
Sobal, Jeffery, Ph.D., U. of Pennsylvania. Prof.
Soloway, Paul, Ph.D., Princeton U. Assoc. Prof.
Stipanuk, Martha H., Ph.D., U. of Wisconsin. Prof.
Stoltzfus, Rebecca, Ph.D., Cornell U. Assoc. Prof.
Stover, Patrick, Ph.D., Medical Coll. of Virginia. Assoc. Prof., DNS Director
Strupp, Barbara, Ph.D., Cornell U. Prof.
Utermohlen, Virginia, M.D., Columbia U. Assoc. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology

Other Teaching Personnel

Gier, Emily, M.B.A., Binghamton U. Lec.
Swanson, Joy, Ph.D., Cornell U. Res. Assoc.
Travis, Sue, Ph.D., Cornell U. Lec.
You, Cha-Sook, Ph.D., Cornell U. Teaching Assoc. and Asst. Dir. of Undergraduate Studies

Joint Appointees

Bauman, Dale, Prof., Animal Science/Nutritional Sciences
Miller, Dennis, Prof., Food Science/Nutritional Sciences

OFFICER EDUCATION

Military instruction began at Cornell University in 1868 under the provisions of the Morrill Act of 1862. Since that time, officer education has been highlighted by the construction of Barton Hall in 1914 and the establishment of a formal Reserve Officers Training Corps (ROTC) unit in 1917. The program evolves to keep pace with the latest military changes and emphasizes the development of leadership and managerial skills.

The Officer Education Programs prepare students for a commission as an officer in either the United States Army, Navy, Air Force, or Marine Corps. Each service program is headed by a senior military officer who also serves as a full professor on the Cornell faculty.

MILITARY SCIENCE

Lieutenant Colonel Steven Alexander,
Professor of Military Science and Chair, 255-5651/-4000

Captain Epstein, Major Johnson, Major Fosdick, SFC Hart, MSG Davis

United States Army ROTC Program

The primary objective of the Army Officer Education Program at Cornell is to commission the future officer leadership of the United States Army. Intermediate objectives are to provide students with an understanding of the fundamentals of responsibility, integrity, and self-discipline, as well as an appreciation of the citizen's role in national defense. The application of the decision-making process to a variety of situations is given major emphasis as a valuable aid in developing leadership potential. These objectives are achieved through a program covering 1.5 to 4 years. The program includes specific courses in military science, practical training in leadership through participation in the Cadet Corps (including attendance at a five-week summer camp at Ft. Lewis, Wash.), and the opportunity to participate in a number of extracurricular activities. This combination prepares the student for commissioning and effective performance in the 16 branches of the Army. One application can result in a one- to four-year scholarship that currently provides \$166,750 in funding over four years.

All courses are open to enrollment without a military obligation; some require instructor permission. Noncitizens may enroll in courses but not commission. Overall sound mental and physical condition is essential; students are required to undergo periodic physical fitness tests.

Four-Year Program

The program is available to graduate and undergraduate students. Veterans of the Armed Forces of the United States and students entering Cornell with AROTC credit from secondary or military schools (Junior Division AROTC) may receive advanced

standing. Under the Four-Year Program students enroll in the Basic Course (MILS I and II) during the first two years, and the Advanced Course (MILS III and IV) during the next two years. A total of 12 credits of military subjects are taken. In addition, academic enrichment courses are required in such fields as written communications, computer science, and military history. All cadets attend a five-week Leadership Development and Assessment Course (LDAC), with pay, between their junior and senior years. All contracted cadets participate in physical fitness training three days per week. Each year selected cadets are sent to the Airborne School, Winter Survival School, and Air Assault Course, depending upon availability and student standings within the ROTC program.

Scholarships

Scholarships are awarded on the basis of merit and are available for 1.5 to 5 years.

Scholarships pay full tuition and mandatory fees, and cadets also receive between \$300 and \$500 a month for up to 10 months a year and \$1,200 a year for books.

Service Obligations

ROTC graduates may serve on active duty, in the Army Reserve, or in the National Guard, depending upon the needs of the Army and the cadet's request. Officers beginning active duty attend the OFFICER BASIC LEADERSHIP COURSE II/III (normally 10 to 16 weeks) for training in their assigned branch. Upon completion, officers are assigned to a unit and location determined by the desires of the individual and the requirements of the Army. Officers selected for reserve duty attend the OFFICER BASIC LEADERSHIP COURSE II/III, after which they are released to reserve status.

Graduate Study

Graduate students are allowed in the program. Active duty deferments, or educational delays, may be granted to individuals who want to attend graduate school at their own expense. Requests will be considered on the basis of the needs of the service. Admission to graduate school is the student's responsibility.

Military Science Courses

All cadets take one course and a leadership laboratory each semester in military science. The number of hours a week spent in the classroom varies from semester to semester, as does the credit received for each course. Additionally, cadets work out three days a week.

Freshman Year (MILS I)

MILS 1101 Foundations of Officership

Fall. 1 credit. Required. M. Davis. Students examine the U.S. defense structure in terms of organization, mission, personnel, and relationships among and between military forces and branches and departments of the government. The U.S. Army force structure is examined at all levels. The complexities and

magnitude of operating the defense organization are studied to provide a framework for subsequent instruction. Students develop skills in conducting oral and written presentations.

MILS 1102 Foundations in Leadership

Spring. 1 credit. Required. M. Davis. Allows students to develop a basic understanding and appreciation of theories of social and organizational psychology and behavior as they apply to the military setting. Attention is given to leader types, the source and exercise of authority, and the impact of varying styles of leadership, resource management, motivation, and organizational effectiveness. The student is instructed in the concepts of integrity, ethics, and professionalism. Classes on historical events and strategy are also presented.

Sophomore Year (MILS II)

MILS 2201 Individual Leadership Studies/Teamwork

Spring. 1 credit. Required. M. Epstein. Students learn the basic principles of group dynamics at the level of the smallest military unit, the squad. Troop-leading procedures are introduced through case studies and role-playing exercises. Leadership theories introduced in MILS 1102 are examined in a variety of realistic settings. The practical application of behavioral theories is explored in the context of small military organizations. The course also provides practical knowledge of the various forms of topographic representation. Students use maps in terrain association and land navigation. Knowledge of topography is complemented by an orientation on significant environmental influences of physical, social, and climatic factors. Portions of the course offer experience in land navigation and orienteering.

MILS 2250 Basic Mountaineering Course

Fall and spring. 2 credits. Open to all students; limited to 20 per sec. Two 1-hour sec: M or R 9-9:50, Barton Hall G-1. Equipment fee: \$30. D. Johnson.

This course instructs techniques for students to cope with mountainous terrain. It discusses and instructs in basic techniques including rappelling, survival, acclimatization, illness and injury, equipment, anchors, evacuation, movement, safety, and training.

MILS 2260 Basic Orienteering

Fall. 1 credit. Open to all students; limited to 20. Equipment fee: \$20. Barton Hall G-1. M. Hart.

This course instructs the principles of orienteering including basic map reading, terrain association, and compass skills. Course running techniques are applied in field orienteering events. Instruction includes safety and survival in hot and cold weather environments.

MILS 2270 Basic Rifle Marksmanship

Fall. 1 credit. Open to all students; limited to 15. W 9-9:50, Barton Hall G-16. Fee for upkeep of systems: \$20. M. Davis.

This course instructs the principles of rifle and pistol safety including marksmanship fundamentals, range procedures, safe weapons handling, and target engagement. Students will use state-of-the-art digital weapons engagement systems as well as real weapons.

MILS 3321 Armed Conflict in Society

Fall. 2 credits. Required. M. Epstein. Provides practical knowledge in American military history. It is primarily an overview course designed to provide an understanding of the art and nature of warfare and particularly how warfare has affected the United States. The course consists of three primary areas of instruction with an emphasis on American military history. The first area of instruction addresses the art and theory of modern warfare. It analyzes America's first attempt at war, the American Revolution, and ends with the development of modern warfare under Napoleon Bonaparte. The second phase focuses on America at war in the 19th century. It places particular emphasis on the American Civil War and the strategy of annihilation versus the strategy of attrition. The final phase looks at warfare in the 20th century and finishes with an analysis of the future of warfare for the military of the United States.

Junior Year (MILS III)

MILS 3301 Leadership and Problem Solving

Fall. 2 credits. Required. R. Brown. After an initial introduction to techniques of presenting briefings, students are provided with a broad understanding of the principles and application of teamwork in military organizations. Particular emphasis is given to the leadership responsibilities of the commander as the team coordinator. This course helps students develop an understanding of the roles and contributions of the various branches of the Army in support of the military team.

MILS 3302 Leadership and Ethics

Spring. 2 credits. Required. R. Brown. Takes on the nature of decision making and the tactical application of the military team. Through the use of conferences and extensive practical exercises, students develop familiarity with the factors influencing a leader's decisions and the process of planning, coordinating, and directing the operations of military units through operation plans and orders.

Senior Year (MILS IV)

MILS 4401 Leadership and Management

Fall. 2 credits. Required. S. Alexander. Provides an overview of the functions, responsibilities, and interrelationships among small-unit leaders, the commander, and the staff. Discussions focus on actions of small-unit leaders, communication skills, army operations, the logistical support of the army in the field, and the army training system. The course focuses on the dynamics of leadership in battle through the detailed analysis of a series of case studies. Just war theory, ethics, and professionalism are also addressed in a seminar fashion.

MILS 4402 Officership

Spring. 2 credits. Required. S. Alexander. A continuation of MILS 4401. Conferences and seminars examine the techniques of effective military leadership, with special attention given to professionalism and ethical considerations in the armed forces during

both peacetime and conflict. Army operations and basic doctrine are also discussed. This is a capstone course designed to prepare the student for commissioning.

Practical Leadership Training

Army Officer-Education Students

No credit is given for leadership training, but participation is required for successful completion of the AROTC program. Students receive physical education credit for the laboratory. Each semester, cadets register for the appropriate leadership laboratory, consisting of physical fitness training three times per week, two hours of military training each week, and one weekend training exercise per semester.

MILS 1111 Leadership Laboratory I

Fall, spring. 0 credits. S-U. MILS I cadets meet for two hours each week to learn a variety of military skills including rappelling, first aid, drill and ceremonies, weapons familiarization, physical fitness training, and small group leadership.

MILS 2200 Leader's Training Course

Summer. 1-6 credits. Prerequisite: permission of instructor. S-U grades only. One to six units of credit may be granted depending upon successful completion of training. Six weeks of training, Fort Knox, Kentucky. Travel pay and salary provided through the Military Science Department. No obligation. LTC graduates eligible to enroll in ROTC Advanced Program.

MILS 2211 Leadership Laboratory II

Fall, spring. 0 credits. S-U. Cadets meet for two hours each week as members of the cadet organization to participate in practical leadership exercises. Types of practical activities include rifle marksmanship, orienteering, drill and ceremonies, signal communications, physical fitness training, first aid, tactics, field exercises, and small group leadership.

MILS 3311 Leadership Laboratory III

Fall, spring. 0 credits. Required. S-U. Cadets meet for two hours a week and occasional weekends to prepare for a five-week summer camp that follows their junior year. Emphasis is placed on the development of individual practical and leadership skills. Cadets rotate through leadership positions to practice applying decision-making skills in a myriad of situations.

MILS 3314 Leadership Development and Assessment Course

Summer. 4 credits. Prerequisite: permission of instructor. S-U grades only. Six-week summer training program required to achieve an Army commission. Training and testing as functional Army officers and determination of potential for service. Travel pay, room and board, and salary are provided by the U.S. Army. Held at Fort Lewis, Washington.

MILS 4400 Special Problems for Advanced Undergraduates

Fall, spring. 1-4 credits. Prerequisite: permission of instructor. Letter grade. Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MILS 4411 Leadership Laboratory IV

Fall, spring. 0 credits. Required. S-U. Senior cadets plan and operate the leadership laboratory programs for MILS I-III cadets. The development of planning and supervisory skills is emphasized. Cadets have an opportunity to practice leadership skills developed during previous ROTC training and summer camp experiences. Includes two to three hours a week devoted to physical fitness.

Professional Military Education (PME) Requirements

In addition to the ROTC classes and leadership laboratories listed above, a number of courses are required as part of the contracted student's academic program. These courses are offered by the university and round out the student's professional education. The PME component of the ROTC program requires at least one college course in each of the following areas: communication skills, military history, and an introduction to computers. Courses that meet these requirements are approved by the Professor of Military Science.

NAVAL SCIENCE

Captain Larry Olsen, United States Navy, Professor of Naval Science and Commanding Officer, Naval ROTC Unit

Lieutenant Colonel Jerry Rizzo, United States Marine Corps

Lieutenant Matthew Zarracina, United States Navy

Lieutenant Douglas Raineault, United States Navy

Lieutenant Reginald Preston, United States Navy

The objective of the Naval Reserve Officers Training Corps Education Program is to prepare students for service as commissioned officers in the United States Navy or United States Marine Corps. This is accomplished by supplementing undergraduate education with instruction in essential concepts of naval science and by fostering qualities of leadership, integrity, and dedication to country. The program is compatible with most undergraduate major fields of study, including five-year baccalaureate degree programs.

The program covers four years and combines specific courses in naval science and specified academic subjects. These courses supplement weekly professional development sessions in which the practical aspects of naval science and leadership procedures are stressed. It also includes at least one summer-at-sea period.

Though the Navy and Marine Corps program has been designed to prepare future officers, naval science courses are open to all students at Cornell as space limitations allow.

Requirements for Enrollment

An applicant for the Naval ROTC program at Cornell must be a citizen of the United States. Applicants must have reached their 17th birthday by September 1 of the year of enrollment and be less than 27 years of age on June 30 of the calendar year in which they are commissioned. Waivers of the upper age limit may be available for applicants who have prior active duty military service. Applicants must also meet physical and medical

requirements. Interested students can visit the Naval ROTC Unit in Barton Hall or contact their local officer recruiter.

Programs

There are two programs: the Scholarship Program and the College Program. The two programs differ primarily in benefits given to the student.

Scholarship Program

The Scholarship Program provides approximately 1,000 scholarships in more than 70 universities nationwide to selected students who want to serve in the Navy or Marine Corps. Financial support is provided to students during college preceding the award of the baccalaureate degree.

Benefits

The program offers scholarships that provide full tuition and are not need-based. While on scholarship, students also receive money for instructional fees, textbooks, nonconsumable supplies, and a stipend of \$250–\$400 a month for a maximum of 40 months.

Successful completion of the Scholarship Program leads to a commission in the Navy or Marine Corps. At Cornell University, over 90 percent of NROTC students have a scholarship. Students entering NROTC without a prior scholarship award are entitled to compete for two- or three-year scholarships controlled by the Naval Service Training Command.

Entering the Scholarship Program

There are three ways to enter the Scholarship Program:

1. by applying to the national competition each year. This process entails filling out and submitting an appropriate application; being interviewed; having a physical examination; and applying to, and being accepted by, one of the colleges or universities throughout the country that offers an NROTC program.
2. by enrolling in the College Program at Cornell and being recommended by the Professor of Naval Science for a scholarship after at least one semester in the program.
3. by entering through the Two-Year Scholarship Program.

College Program

Two College Programs are available. Both lead to a commission in the Navy or Marine Corps.

Starting in the junior year, each of these programs provides textbooks for naval science courses, uniforms, and a subsistence allowance of \$350–\$400 a month.

The regular College Program is four years long. Academic requirements for students in this program are somewhat fewer than those for scholarship students, as noted in the curriculum section of this book.

The Two-Year College Program begins the summer before the junior year; students attend a required program, with pay, at the Naval Science Institute in Newport, R.I.

Summer Training

Each summer, students in the Scholarship Program spend approximately four to six weeks on a Navy ship, or participate in a naval activity that may take place anywhere in the world, for on-the-job training. College Program students attend one summer training session of the same duration between the junior and senior years.

Active Duty Requirements

Scholarship midshipmen commissioned in the Navy or Marine Corps serve on active duty for a minimum of four years. College program midshipmen commissioned in the Navy or Marine Corps serve a minimum of three years. In some cases, following commissioning, specialized training such as aviation or nuclear power will add additional active duty requirements.

Choice of Assignment

Graduates have the opportunity to request the duty they prefer upon graduation. These requests are given careful consideration, and every effort is made to assign newly commissioned officers to their duty of choice.

Among the assignments available are duties in naval aviation as either a pilot or naval flight officer, on submarines, and on surface ships. Other specialties, such as special warfare or medical service corps, may be available on a limited basis.

Marine Corps Options

The United States Marine Corps is an integral part of the Naval Services and is commanded by the Commandant of the Marine Corps. One-sixth of the NROTC scholarship students may be Marine selectees who will be designated Marine-option midshipmen. Upon successful completion of the program they will be appointed Second Lieutenants in the United States Marine Corps.

Marine-option midshipmen follow the same program as other NROTC midshipmen for the first two years. Beginning with the junior year, Marine-option midshipmen are taught Marine-oriented courses by a Marine Officer Instructor. For First Class summer training (after the junior year), Marine-option students travel to Quantico, Va., where they undergo six weeks of intensive training known as the USMC Officer Candidate School. Upon commissioning the following year as Second Lieutenants, they are assigned to the Basic School at Quantico, Va. After the Basic School, the Marine officer is assigned duty in a variety of occupational fields. Among the duties available are infantry, aviation, artillery, tracked vehicles, engineering, communications, electronics, supply, administration, and computer science. The officer may serve on board naval vessels or at shore installations of the Marine Corps or Navy, either in this country or overseas.

The Marine Corps has a postgraduate training system similar in objectives and organization to that of the Navy. Marine officers selected for aviation receive flight training at the Naval Air Station, Pensacola, Fla., along with their Navy counterparts.

Curriculum

A student has three categories of requirements to fulfill as a midshipman. The first of these

requirements is a weekly naval professional development session each semester. The second requirement is a naval science course each semester. The last set of requirements consists of further courses prescribed by the Navy to meet the growing need for more and better technically educated junior officers.

Naval Professional Laboratories

NAVS 1141, 2241, 3341, 4441

All students in the program participate in a two-hour professional development session each week. The session is held from 2:30 until 4:30 on Wednesday afternoons and consists of drill, athletics, and professional information events. Students gain experience in actual leadership situations and learn the fundamentals of seamanship, military formations, movements, commands, discipline, courtesies, and honors. During information briefings, special emphasis is given to applied leadership as it relates to the administrative and managerial aspects of a Navy or Marine Corps officer's duties.

Naval Science Courses

All Navy and Marine midshipmen take one naval science course each semester during their freshman and sophomore years. Navy-option students continue to take a naval science course each semester during their junior and senior years. Marine-option students have slightly different curriculum requirements for their junior and senior years.

Freshman Year (Navy and Marines)

NAVS 1101 Fundamentals of Naval Science

Fall. 1 credit. M. Zarracina.

Involves a study of fundamental aspects of naval science. This includes contributions to sea power, different warfare communities involved in the physical development of naval forces, and study of resource management and naval science prospects for the future. Naval uniforms, customs, and traditions are also covered.

NAVS 1102 Sea Power and Maritime Affairs

Spring. 3 credits. M. Zarracina.

Discussions examine the history of the Navy as a force in diplomacy and an instrument of U.S. foreign policy. Relationships between Congress and the military for determining the national defense policy are also explored. An integrated examination of current events and issues lends historical perspective throughout the course.

NAVS 1480 Small Boat Sailing (also PE 1480)

Fall and spring. Physical education credit. Instructor TBA.

This is a course of instruction in basic sailing skills and safety principles. Students sail small boats on Cayuga Lake. Focus is on U.S. Navy Class B inshore skipper certifications.

Sophomore Year (Navy and Marines)

NAVS 2201 Leadership and Management I (also HADM 1115)

Fall. 3 credits. L. Olsen and J. Rizzo.

The theme of the course is the "evolving role of the manager, organizational decision maker, and leader." The course begins by briefly covering the theoretical principles of management and progresses through practical skills used by managers and leaders. Lectures,

reading assignments, films, and discussions provide students with an excellent opportunity to consider complex managerial and leadership issues. The goal of this course is for students to begin to develop a sound personal leadership philosophy that will enable them to more effectively accomplish the assigned responsibilities of leading men and women in today's demanding and high-tech naval environment.

NAVS 3201 Naval Ship Systems I (also MAE 1110)

Fall. 3 credits. R. Preston.

Introduces primary ship-systems and their interrelationships. Basic principles of thermodynamics, propulsion, mechanical operation, internal communications, electronics, ship structure, and other marine systems are covered.

Junior Year (Navy)

NAVS 2202 Navigation (also BEE 3050)

Spring. 4 credits. D. Raineault.

Introduces the fundamentals of marine navigation emphasizing piloting and electronic navigation procedures. Covers coordinate systems, chart projections, navigational aids, instruments, compass observations, time, and study of tides and currents. Electronic navigation systems are discussed.

NAVS 4401 Naval Operations

Fall. 3 credits. D. Raineault.

Covers the application of the nautical rules and maneuvering board in order to avoid collisions at sea. Other aspects of naval surface ship operations that are introduced include visual and electronic communications methods, tactical disposition of forces, ship handling theory, and deck seamanship topics.

Senior Year (Navy)

NAVS 3202 Naval Ships Systems II (Weapons)

Spring. 3 credits. R. Preston.

Examines the principles and theories used in the development of naval weapons systems. Extensive study is made of detection systems, especially radar and sonar, followed by discussions of ancillary systems for computing, stabilizing, tracking, and weapons control and delivery.

NAVS 4402 Leadership and Ethics

Spring. 3 credits. L. Olsen.

Reviews a variety of topics important to the naval officer for both professional and managerial development. The material is designed to provide the midshipman with an understanding and appreciation of leadership and ethics in preparation for assignments in the naval service. Through the use of lectures, case studies, and role-playing, the student learns various aspects of naval leadership and ethical decision making. Marine-option students may also take this course.

Junior or Senior Year (Marine Options)

NAVS 3310 Evolution of Warfare

Spring. 3 credits. J. Rizzo.

A study of warfare that examines the relationship of military strategy to geography, economics, sociology, technology, and governing policy. This course examines the historical evolution of warfare, including principles of war, development of weapons and their effects on warfare, and the political goals associated with specific adversaries through history.

NAVS 4410 Amphibious Warfare

Spring. 3 credits. J. Rizzo.

The history of the development, theory, techniques, and conduct of amphibious operations from 490 BC to the present. Special emphasis is placed on amphibious operations conducted in the central Pacific during World War II and on the future of amphibious operations.

Other Required Courses

Navy-Option Scholarship Program

To be eligible for a commission in the United States Navy, midshipmen must successfully complete all the requirements for a baccalaureate degree in any field of study offered by Cornell University, and complete courses in the following subjects (specified courses to be approved by the Professor of Naval Science):

American Military Affairs or National Security Policy (one semester)

English (one year)

Calculus (one year)

Calculus-based physics (one year)

World Cultures/Regional Studies (one semester)

The calculus requirement must be satisfied by the end of the sophomore year and the physics requirement by the end of the junior year.

Although free choice of academic majors is permitted, students are encouraged to pursue majors in engineering and the physical sciences so that they may be best prepared to meet the technological requirements of the modern Navy.

Navy-Option College Program

Navy-option College Program students must complete college-level study in mathematics (1 year), physical science (1 year), and English (1 year), American Military History or National Security Policy (1 semester), and World Culture and Regional Studies (1 semester) as a prerequisite for commissioning. The mathematics course must be completed by the end of the junior year, the physical science course by the end of the senior year. College Program students who desire entry into the Navy-option Scholarship Program should fulfill all of the requirements applicable to Navy-option scholarship students if they wish to be eligible for a scholarship controlled by the Naval Service Training Command.

Marine Option

Any midshipman, in either the Scholarship Program or the College Program, who completes all of Cornell University's degree requirements in any academic major is eligible for a commission in the U.S. Marine Corps or U.S. Marine Corps Reserve. Marine-option students take the same naval science courses and naval professional laboratories as Navy-option students for the freshman and sophomore years. During the junior and senior years, Marine-option students have slightly different naval science course requirements than their Navy-option counterparts. One semester (a minimum of 3 hours) of courses in American Military Affairs or National Security Policy is required.

Extracurricular Activities

The NROTC midshipman at Cornell is offered a broad range of activities, including sail training and a comprehensive intramural sports program. Midshipmen participate in a myriad of social events, including the annual Navy/Marine Corps Birthday Ball.

DEPARTMENT OF AEROSPACE STUDIES

Lieutenant Colonel Michael Williamson, United States Air Force, Professor of Aerospace Studies and Commander, Air Force ROTC Detachment 520

Captain Misty Johnson, United States Air Force, Assistant Professor of Aerospace Studies and Commandant of Cadets, Air Force ROTC Detachment 520

Captain Phillip Ulmer, United States Air Force, Assistant Professor of Aerospace Studies and Unit Admissions Officer, Air Force ROTC Detachment 520

The objective of the Air Force Officer Education Program at Cornell is to prepare men and women for positions as officers in the United States Air Force. The program is designed to teach students about the mission and organization of the Air Force, the historical development of airpower, leadership, and management. Students study national security policy and the role of the military in a democratic society. This program includes specific courses in aerospace studies and practical leadership laboratories. Additionally, the Department of Aerospace Studies seeks to inform and engage noncadet students about the U.S. military, in general, and the USAF, in particular.

Requirements for Enrollment

The Air Force Officer Education Program is open to any qualified undergraduate or graduate student enrolled in any major field of study. Though the program is designed to prepare future Air Force officers, academic courses in the Department of Aerospace Studies are open to all students at Cornell without incurring any military obligation. An applicant must be a United States citizen to become a commissioned officer. Noncitizens may enroll and will receive certificates acknowledging completion of the course but cannot receive a commission. U.S. permanent residents who are naturalized by their date of graduation may receive a commission.

All applicants receive physical examinations at no cost and must meet certain physical requirements to be accepted. Students who are interested in qualifying for flying categories (pilot, navigator, or air battle manager) must meet more stringent physical requirements. In addition, students enrolled in the commissioning program must meet specified physical fitness requirements each semester.

Four-Year Commissioning Program

The Four-Year Program is open to all qualified freshmen. Sophomores and juniors may also enter a condensed version of the four-year program with the approval of the department head. Many students join the program after the first semester of their freshman year. If interested, contact the department for details.

Veterans of the U.S. armed forces, students entering Cornell from military schools, or high school students with documented Junior ROTC or Civil Air Patrol involvement may receive advanced academic standing, subject to approval by the Professor of Aerospace Studies.

The Four-Year Program consists of a two-year General Military Course (GMC) program of study followed by a two-year Professional Officer Course (POC) program of study. For four-year scholarship cadets, the first year of the GMC carries no military commitment, and students may withdraw at any time. Entry into the POC does carry a military commitment. For nonscholarship cadets, both years of the GMC carry no military commitment, and students may withdraw at any time.

General Military Course

Students in General Military Courses (GMC) take a 1-credit Aerospace Studies course each semester. During the freshman year, the student examines the organization and mission of the United States Air Force and the environment of the Air Force officer. In the sophomore year, the student studies the history and development of American air power. In both years, officership and professionalism within the United States Air Force are emphasized.

Students also spend two hours a week in a leadership laboratory. Leadership laboratories provide cadets with an opportunity to put into practice the skills they have learned in their aerospace studies classes. These laboratories focus on the development of officer qualities through activities such as drill and ceremonies, group leadership problems, confidence-building exercises, and guest lecturers. Students who intend to continue on into the Professional Officer Course and pursue a commission will participate in summer field training for four weeks between their sophomore and junior years; some students may complete field training between their junior and senior years.

Professional Officer Course

The Professional Officer Courses (POC) provide a two-year advanced program of instruction. Each cadet accepted into the POC must sign an agreement to complete the program and accept, if offered, a commission in the United States Air Force upon graduation. Completing the GMC program of study is not required for POC entry. Many students join the program after their freshman year. Contact the Department of Aerospace Studies for details.

Classroom study in the POC is a 3-credit course each semester. In the junior year, cadets study Air Force leadership and management at the junior officer level. During the senior year, cadets study the elements of national security and the military's role in American society. Leadership laboratory requires two hours a week in the junior and senior years. In leadership laboratory, cadets are exposed to advanced leadership experiences and apply principles of leadership learned in the classroom.

Two-Year Commissioning Program

The Two-Year Program consists of the last two years of the regular Four-Year Program plus a five-week summer training course.

The Two-Year Program is open to all qualified students with two years of academic study remaining. Graduate or undergraduate entry into this program depends on the needs of the Air Force. Many students join the program after their freshman year. Interested students should contact the department for information.

Scholarships

The Air Force offers three- and four-year scholarships to high school seniors and one-, two-, and three-year scholarships to college students. Four-year scholarships are offered on a competitive basis to high school seniors. Scholarship information can be obtained from a high school guidance counselor, from Air Force ROTC officers at Cornell (AFROTC phone number is 607-255-4004), from a local Air Force recruiter, via the web at www.afrotc.com, or from the Air Force ROTC scholarship section, Maxwell AFB, AL 36112-6106, 334-953-2869. The deadline for submitting a four-year scholarship application is December 1 of the year preceding the academic year in which a student wants to enter the program. Students should apply early.

Scholarships for two and three years.

Applications for these scholarships should be made to the Professor of Aerospace Studies during the freshman, sophomore, or junior years of college. All selections are based on the student's major, scores achieved on the Air Force Officer Qualifying Test, the student's overall grade point average, and the recommendation of the Professor of Aerospace Studies. Scholarships include amounts ranging from \$3,000 per year to full tuition and fees. There is a monthly \$300-\$500 nontaxable allowance during the school year. A \$900 per year textbook allowance is included in every scholarship. Scholarships do not include the cost of room and board. All AFROTC scholarships are merit-based, not need-based.

Fees

An initial uniform deposit of \$50 is required on entry into AFROTC. Before commissioning, cadets may purchase uniforms with their deposit or return uniforms and receive their deposit back.

Benefits

All cadets in the advanced program—whether they are on scholarship or not—receive a \$450-\$500-a-month, nontaxable subsistence allowance during the academic year. During the four- or five-week summer field training (see below), each cadet receives a pay allowance plus an allowance for travel to and from the field site. Textbooks and supplies required for Department of Aerospace Studies courses are provided.

All cadets are eligible to participate in AFROTC-sponsored field trips made to Air Force bases throughout the country as well as voluntary summer programs for professional development. Scholarship and POC cadets are entitled to space-available travel on Air Force aircraft flying within the continental United States.

Field Training

Two types of field training are available: a four-week course for cadets in the Four-Year Program and a five-week course for Two-Year Program applicants.

Field training is designed to stimulate the development of military leadership skills through meaningful experiences. The curriculum consists of aircraft, aircrew, and survival orientation; junior officer training; physical training; small arms training; team building and leadership training. The five-week training program includes 60 hours of Air Force ROTC academic course work that substitutes for the freshman and sophomore Aerospace Studies courses. Cadets are evaluated for their officer potential at field training.

Cadets may also volunteer for one of many Advanced Training Programs. These programs can include but are not limited to the Air Force Academy Free-Fall Parachute Training, Technical Research and Development Internships, the Academy Soaring Program, Special Operations Training, and language and cultural immersion programs.

Commissioning Obligations

All students who successfully complete the AFROTC advanced program must be awarded a baccalaureate degree before receiving their commission. They then enter the Air Force as second lieutenants.

Second lieutenants commissioned in nonflying categories are required to serve on active duty for four years. Pilots are required to serve on active duty for 10 years after completing flying training. Navigators and Air Battle Managers serve eight and six years respectively after completing training.

Air Force Careers

The Air Force assigns new officers to a career field based on mission requirements, educational background, and officers' preferences. Students in the engineering-scientific category may be assigned to practice in their specialty in research and development, communications, electronics, aeronautics, astronautics, the biological sciences, computer design and maintenance, meteorology, space, or other engineering and scientific fields. Graduates in the nontechnical category can anticipate assignments in manpower management, information management, logistics, law enforcement and investigation, intelligence, personnel, public affairs, transportation, accounting and finance, and other career fields. Specializations for language and cultural studies majors are also available.

Any undergraduate major is suitable for those who are qualified and interested in entering the space and missile career fields or in becoming pilots, navigators, or air battle managers. After completion of flying training, personnel are assigned to a specific type of aircraft.

Curriculum

Students in the Four-Year Program are required to take all courses listed below. Students in the Two-Year Program are required to take all of the courses listed for the junior and senior years. There are no prerequisites for any Aerospace Studies courses.

Freshman Year**AIRS 1161 The Foundations of the United States Air Force I**

Fall. 1 credit. P. Ulmer.

This is a survey course designed to introduce students to the United States Air Force and Air Force Reserve Officer Training Corps. Featured topics include: mission and organization of the Air Force, officership and professionalism, military customs and courtesies, Air Force officer career opportunities, war and the American military, and Air Force heritage. Leadership laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

AIRS 1162 The Foundations of the United States Air Force II

Spring. 1 credit. P. Ulmer.

Continuation of AIRS 1161. Topics include Air Force core values, human relations, team building, communication skills, and officer leadership.

Sophomore Year**AIRS 2211 The Evolution of USAF Air and Space Power I**

Fall. 1 credit. M. Williamson.

This course is designed to examine general aspects of air and space power through a historical perspective. The course covers a time period from the first balloons and dirigibles to the role of air power in the Korean conflict. Historical examples are provided to illustrate the development of Air Force capabilities and functions to demonstrate the evolution of what has become today's USAF air and space power. The course examines several fundamental truths associated with war in the third dimension, and provides students with an understanding of the general element and employment of air and space power from an institutional, doctrinal, and historical perspective. In addition, students continue to discuss the importance of the Air Force core values.

AIRS 2212 The Evolution of USAF Air and Space Power II

Spring. 1 credit. M. Williamson.

Continuation of AIRS 2211. This course covers the role of airpower from Vietnam to the present day. Attending AIRS 2211, while helpful, is not required to take AIRS 2212.

Junior Year**AIRS 3331 Air Force Leadership Studies I**

Fall. 3 credits. P. Ulmer.

This course is a study of leadership required of an Air Force junior officer; it has applicability to any entry-level professional as a junior executive. The course investigates theories and styles of leadership, power and influence, the meaning and function of followership in the military context, critical thinking, problem solving and team building, group conflict management, situational leadership, and management functions and principles. Films and case studies are used for analysis of theories and principles studied. Students receive instruction and practice effective writing (e.g., background and position papers) and briefing skills (e.g., informative and advocacy briefings) for professional communications; students practice both modes of communication. The course also provides professional officer education in terms of defining professional

and unprofessional relationships, working with civilian personnel, and the profession of arms. The course is open to any student. For officer candidates, a mandatory leadership laboratory complements this course.

AIRS 3332 Air Force Leadership Studies II

Spring. 3 credits. Open to any student. P. Ulmer.

A continuation of AIRS 3331. The course investigates advanced skills in leadership: dynamic subordinacy, effective supervision, essentials of counseling, corrective supervision, professional authority, responsibility, and accountability. The course also investigates the meaning and application of ethical and moral leadership, professional officer ethics, military ethics in joint operations, and the core values of the Air Force. Film and case studies are used for analysis of course content. Written and briefing practice continues. For officer candidates, a mandatory leadership laboratory complements this course.

Senior Year**AIRS 4401 National Security Affairs/Preparation for Active Duty I**

Fall. 3 credits. M. Williamson.

This course is concerned with the national security process, regional studies, advanced leadership ethics, and Air Force doctrine. Other topics include the military as a profession, officership, military justice, civilian control of the military, preparation for active duty, and current issues affecting military professionalism. Continued emphasis is given to refining communication skills. A mandatory leadership laboratory complements this course by providing advanced leadership experiences, giving students the opportunity to apply the leadership and management principles described in this course.

AIRS 4402 National Security Affairs/Preparation for Active Duty II

Spring. 3 credits. M. Johnson.

Continuation of AIRS 4401.

Leadership Laboratory Courses

All Air Force cadets spend two hours a week throughout the academic year in a leadership laboratory. Occasionally laboratories are held at times other than the normally scheduled period. All cadets are expected to participate in a formal dinner and to meet minimum physical fitness and weight standards each semester. Leadership lab is open to students qualified to compete for an Air Force commission.

AIRS 1141 Initial Military Experiences

Fall and spring. 0 credits. Required. S-U grades.

Introduction to the responsibilities, life, and work of an Air Force officer. Basic knowledge of drill and ceremonies, military courtesies, and the wearing of the uniform. This course includes a field trip to a local military installation.

AIRS 2241 Intermediate Military Experiences

Fall and spring. 0 credits. Required. S-U grades.

Designed to help students develop skill in giving commands for drill and ceremonies. Students are also introduced to the Air Force base environment in which the officer functions. Career areas available based on academic majors are described. Students

participate in military drills and ceremonies and go on a field trip to a local military installation.

AIRS 3341 Junior Officer Leadership Experiences

Fall and spring. 0 credits. Required. S-U grades.

Cadets assume leadership responsibilities similar to those of a junior officer. Emphasis is on the importance of applying effective human relations skills in dealing with superiors, peers, and subordinates. Cadets also gain insight into the general structure and progression patterns of selected Air Force officer career fields.

AIRS 4441 Advanced Leadership Experiences

Fall. 0 credits. Required. S-U grades.

Cadets assume command leadership responsibilities to operate a military organization. Cadets apply effective leadership and managerial techniques with individuals and groups and participate in self-analysis of leadership and managerial abilities.

AIRS 4442 Precommissioning Laboratory

Spring. 0 credits. Required. S-U grades.

Factors that facilitate transition from civilian to military life are reviewed. The need for military security, base services and activities, personal finances, travel regulations, and social obligations are introduced.

COLLEGE OF VETERINARY MEDICINE

ADMINISTRATION

Michael I. Kotlikoff, dean

Robert O. Gilbert, associate dean for clinical programs

Alfonso Torres, associate dean for veterinary public policy

Drew M. Noden, secretary of the college

Katherine M. Edmondson, assistant dean for learning and instruction

Robert F. Gilmour Jr., associate dean for research and graduate education

Gene R. Wheeler, assistant dean for finance and administration

Kevin Mahaney, assistant dean for alumni affairs and development

Lorin D. Warnick, associate dean for veterinary curriculum

Judith A. Appleton, associate dean for academic affairs

Bruce L. Akey, assistant dean for diagnostic operations

Douglas F. Antczak, director, James A. Baker Institute for Animal Health

Carol S. Gary, director of student financial planning

Erla Heyns, director, Flower Sprecher Veterinary Library

Mary Beth Jordan, director of human resources

Douglas D. McGregor, director of leadership and training initiatives

Jennifer A. Mailey, director of admissions

Jai Sweet, director of student services and multicultural affairs

DEPARTMENT CHAIRS

Biomedical Sciences: M. Roberson

Clinical Sciences: R. Page

Microbiology and Immunology: D. Russell

Molecular Medicine: G. Weiland

Population Medicine and Diagnostic Sciences: Y. Grohn

THE COLLEGE

The College of Veterinary Medicine offers a professional program that requires four years of full-time academic and clinical study of the normal and abnormal structure and function of the animal body and the diagnosis, treatment, and prevention of animal disease.

Graduates of the college receive the doctor of veterinary medicine (D.V.M.) degree, which is recognized by licensing boards throughout the world. Graduates generally enter private practice or academia, or become engaged in

one of an increasing number of biomedical activities.

Admission requires a minimum of three years of college work, including specific prerequisite courses and experience. Applications must be filed approximately one year before the proposed matriculation date. The competition for admission is keen, since there are many more qualified applicants than can be admitted.

Graduate programs in veterinary research and postdoctoral training in clinical specialties are open to doctors of veterinary medicine and some highly qualified holders of baccalaureate degrees and lead to the degree of master of science or doctor of philosophy.

More detailed information is available at the College of Veterinary Medicine web site, www.vet.cornell.edu/.

Note: 5000- and 6000-level courses are open only to veterinary students except by written permission from the instructor.

The College of Veterinary Medicine's professional curriculum comprises courses in two categories: Foundation courses and Distribution courses.

Courses contributing to the D.V.M. degree begin with VTMED.

FOUNDATION COURSES

Foundation courses are interdisciplinary and represent approximately 70 percent of the professional curriculum. In Foundation courses I, III, and IV (VTMED 5100, 5300, 5400), students work in small groups under the guidance of a faculty tutor. Case-based exercises are used to facilitate the understanding of basic science concepts within the context of clinical medicine. In some courses, three two-hour tutorial sessions are scheduled each week. These are complemented by lectures, laboratories, and discussion sessions or other organized learning opportunities specific to the individual course. Faculty members are available to respond to questions that arise as a result of the case-based exercises.

Tutorial sessions and all other organized learning programs are scheduled primarily during the mornings, thereby reserving time in the afternoon for independent study. By learning in a clinical context, students are better able to integrate material from the basic and clinical sciences and are encouraged to develop an understanding of the clinical reasoning process from the beginning of the curriculum. The tutorial-based educational format creates an atmosphere that requires students to be involved actively in their learning and allows them to develop skills in communication, information retrieval, and analysis.

Note: Courses listed in brackets [] are approved courses that are not offered during the 2009–2010 academic year.

VTMED 5100 The Animal Body (Foundation Course I)

Fall. 12 credits. Prerequisite: first-year veterinary students. Letter grades only. Fee charged for course guide. L. Mizer and staff.

Designed to enable students to understand the principles of veterinary anatomy at the gross, microscopic, and ultrastructural levels.

Emphasizes developmental anatomy to the extent that it reflects determination of adult form and species differences. Radiologic and related imaging techniques are used throughout the course to assist in the understanding of normal structural anatomy. Understanding of the anatomic basis of common surgical procedures is achieved during the various dissection procedures. The course is based on tutorials with significant emphasis on practical laboratories. Lectures and modules complement student learning.

VTMED 5200 Cell Biology and Genetics (Foundation Course II)

Fall and spring. 8 credits. Prerequisite: first-year veterinary students; VTMED 5100.

Letter grades only. G. A. Weiland and staff.

Designed to develop an appreciation of the molecular and cellular basis of animal health and disease. Students gain an understanding of the molecular mechanisms that regulate cell function, the molecular signaling processes that form the basis of integrated function and the response to disease, and the mechanisms underlying inherited traits and genetic disease. Students are introduced to the pathologic basis of disease and the immune response by studying cellular responses to injury. Emphasis is placed on defining and characterizing normal cell function and on understanding how mutations in specific genes promote disease. Fundamental biological processes as revealed by gross and microscopic pathological changes are emphasized. The course is divided into two parts separated by a midterm exam. The first part is made up of three sections: Principles of Cell Biology, Cell Signaling, and Medical Genetics. The second half of the course builds upon and expands these principles, using examples from veterinary medicine including wound repair and cancer. In both parts, clinical cases are utilized to illustrate the concepts presented.

VTMED 5220 Neuroanatomy

Spring. 1 credit. Prerequisite: first-year veterinary students. Letter grades only. M. FitzMaurice.

Designed to give students the necessary background for the understanding of neurophysiology and clinical neurology. Students will gain a basic understanding of the gross anatomy of the central nervous system (CNS), pathways involved in somatosensory and motor systems, as well as some exposure to modern imaging of the CNS (CT and MRI correlates with gross coronal sections of the CNS).

VTMED 5300 Function and Dysfunction: Part I (Foundation Course IIIa)

Spring, 9 credits. Prerequisite: first-year veterinary students; VTMED 5200. Letter grades only. Fee charged for course guide. Live animals used on limited basis for demonstration of noninvasive procedures. R. Rawson and staff.

Designed to develop students' understanding of how an animal maintains itself as a functional organism; how the maintenance of function is achieved through the integration of different organ systems; how tissue structure relates to tissue function; how injury alters structure and leads to dysfunction, manifested as clinical signs; how organ function can be assessed; and how organ function can be modulated pharmacologically. The course incorporates aspects of physiology, biochemistry, cell biology, histology, pathology and histopathology, clinical pathology, and pharmacology.

VTMED 5310 Function and Dysfunction: Part II (Foundation Course IIIb)

Fall, 7 credits. Prerequisite: second-year veterinary students; VTMED 5300. Letter grades only. Fee charged for course guide. R. Rawson and staff.

Continuation of VTMED 5300 Function and Dysfunction: Part I.

VTMED 5400 Host, Agent, and Defense (Foundation Course IV)

Fall, 12 credits. Prerequisite: second-year veterinary students; VTMED 5310. Letter grades only. Fee charged for course guide. D. Bowman (course leader) and staff.

This course seeks to develop an understanding of the interplay between the immunological system of the host and the most significant bacterial and viral agents that cause disease in animals. Lectures focus primarily on adaptive and innate immunity, as well as bacterial and viral pathogens and the diseases they cause. Autoimmunity, epidemiological methods to investigate infectious disease at the herd and single-animal levels, and techniques and tools to control infectious disease are also important components of the course. In the laboratory, animals are used to illustrate some aspects of infectious diseases.

VTMED 5410 Veterinary Parasitology

Fall, 2.5 credits. Prerequisite: second-year veterinary students. Letter grades only. D. D. Bowman.

Provides a basic introduction to animal parasites of veterinary importance, concentrating mainly on the biology, control, and diagnosis of protozoan and metazoan parasites. Emphasizes parasites representative of significant disease processes or of significant clinical importance to veterinarians. Elaborates on the biology and pathogenesis of these major pathogens with the ultimate goal being to maximize the recognition of the major disease manifestations induced by the different groups of organisms. Laboratories stress certain aspects of some important parasite groups.

VTMED 5500 Animal Health and Disease: Part I (Foundation Course V)

Spring, 10 credits. Prerequisite: second-year veterinary students; VTMED 5400. Letter grades only. Fee charged for course guide. S. Fubini and D. W. Scott.

Integrates the clinical sciences of medicine, surgery, anesthesiology, radiology, and theriogenology, which are themselves integrated subjects, with systems pathology

and relevant aspects of applied pharmacology. The course is presented on a systems basis, moving from clinical signs of alteration in function, to pathophysiology of clinical signs, to strategies for diagnosis and treatment. Specific examples are used to establish a cognitive framework and knowledge of the most important diseases. This course provides a sound foundation for clinical rotations in Foundation Course VI. It builds on the strengths developed in earlier courses by an increased exposure to case examples in a more directed way, taking advantage of the diversity of skills and special knowledge of both faculty and students. A variety of educational techniques are used, including lectures in which interaction is encouraged, laboratories, demonstrations, case discussions, and autotutorials.

VTMED 5510 Animal Health and Disease: Part II (Foundation Course V, continued)

Fall, 20 credits. Prerequisite: third-year veterinary students; VTMED 5500. Letter grades only. Fee charged for course guide. S. Fubini and D. W. Scott.

Continuation of VTMED 5500 Animal Health and Disease: Part I.

VTMED 5600 Ambulatory and Production Medicine

Fall, winter, spring, and summer, 2 credits. Required component of Clinical Rotations (Foundation Course VI). Students can take more than one week early but a minimum of one week must be completed during Block VI. C. Guard and staff.

Clinical service rotation in which students accompany ambulatory clinicians on farm and stable calls and learn the skills and procedures necessary for operation of a modern veterinary practice offering primary care to large-animal clients. Routine herd health visits are conducted for cattle, horses, sheep, goats, and swine. Reproductive evaluations (including pregnancy and fertility examinations), nutritional evaluation, and disease prevention are stressed. Herd health programs also include vaccinations, parasite control, mastitis prevention, and routine procedures. With appropriate herds, analysis of computerized performance data is conducted and discussed with the owner. In addition to assisting with routine scheduled work, students participate in diagnosis and medical or surgical treatment of ill or injured animals. This includes rotating assignments for night and weekend duty.

VTMED 5601 Community Practice Service: Medicine

Fall, winter, spring, and summer, 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. W. E. Hornbuckle and staff.

Structured to provide supervised clinical experience in the practice of companion small-animal medicine. The course is conducted in the Companion Animal Hospital of the Cornell University Hospital for Animals. Students interact directly with clients presenting their pets for primary medical care. Under the supervision of the clinical faculty and staff, the students are expected to formulate and carry out plans for the diagnostic evaluation and medical management of these patients. After review, students explain their plans to the clients and provide follow-up care and management of these patients.

VTMED 5602 Small-Animal Medicine

Fall, spring, winter, and summer, 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. S. C. Barr, S. A. Center, J. F. Randolph, K. W. Simpson, and R. Goldstein.

Structured to provide supervised clinical experience in the practice of companion small-animal medicine. The course is conducted in the Companion Animal Hospital of the Cornell University Hospital for Animals. Students interact directly with clients presenting their pets for primary or referral medical care. Under the supervision of the clinical faculty and staff, the students are expected to formulate and carry out plans for the diagnostic evaluation and medical management of these patients.

VTMED 5603 Small-Animal Soft Tissue Surgery Service

Fall, winter, spring, and summer, 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. H. J. Harvey and small-animal surgery faculty.

Clinical service rotation that exposes the student to the practice of surgery under hospital conditions. Students participate in office hours, diagnostic techniques; planning of therapy; and daily care of dogs and cats under the direction of a faculty veterinarian. Students assist experienced surgeons in the operating room. Client communications and the basics of efficient practice are emphasized.

VTMED 5604 Large-Animal Medicine Service

Fall, winter, spring, and summer, 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. G. Perkins, D. Ainsworth, T. Divers, and M. Flaminio.

Students assigned to this service assist the faculty, technicians, and residents of the Large-Animal Medicine Service in the diagnosis and care of patients. The goal of this course is for students working on this service to acquire knowledge and skills in history taking, physical examination, selection and completion of appropriate ancillary tests, diagnosis, treatment, and patient care. Daily rounds and discussions are used to monitor patient progress and further educate students. If time allows, sit-down rounds to discuss medical disorders are provided.

VTMED 5605 Large-Animal Soft Tissue Surgery Service

Fall, winter, spring, and summer, 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. A. J. Nixon and staff.

Clinical rotation structured to provide supervised clinical experience in the practice of large-animal surgery. Under the direction of faculty and house staff, students participate in the diagnosis, surgical treatment, and care of patients presented to the Equine and Farm Animal Hospital. Training through patient care is supplemented by formal rounds and didactic instruction.

VTMED 5606 Anesthesiology Service

Fall, winter, spring, and summer, 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. A. L. Campoy, R. D. Gleed, W. A. Horne, A. L. Looney, J. W. Ludders, M. Flores, and staff.

Designed to provide clinical experience in the use of anesthetics in small companion

animals, horses, and some food animals. Students participate in selecting suitable anesthetic techniques for patients in the Cornell University Hospital for Animals and then implement those techniques under the supervision of faculty and residents. The goal is for students to learn the skills and thought processes necessary to perform safe anesthesia in a modern veterinary practice.

VTMED 5607 Dermatology Service

Fall, winter, spring, and summer. 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. W. H. Miller and D. W. Scott.

During this clinical rotation, students participate in the diagnosis and management of skin disorders in small and large animals. Patients are examined by appointment and through consultation with other hospital services.

VTMED 5608 Ophthalmology Service

Fall, winter, spring, and summer. 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. T. Kern, N. Irby, and E. C. Ledbetter.

Combines clinical experience with beginning skills in diagnostic ophthalmology. Students learn how to apply the ophthalmic diagnostic tests. A competent ocular examination is the goal of this rotation. Confidence in using direct and indirect ophthalmoscopes, slit lamps, tonometers, gonioscopes, conjunctival cytology, and surgery comes with the practice provided by this rotation. Students are required to review the introductory orientation videotapes in the autotutorial center titled *Ocular Examination I and II* before the start of the rotation. This rotation provides surgical experience and consultations. A high percentage of the consultations are referral cases that usually challenge the service. Adequate routine case material is presented to prepare most students for practice.

VTMED 5609 Pathology Service

Fall, winter, spring, and summer. 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. S. P. McDonough and staff.

The pathology rotation strives to integrate gross pathology with other diagnostic modalities. Students will work in groups of three to five for the two-week rotation performing necropsies on mammals, birds, exotic species, and laboratory animals under the guidance of pathology faculty and residents. Students will prepare written reports of the necropsies performed and discuss the findings at daily morning rounds. Students will also be instructed by faculty of the Animal Health Diagnostic Center with expertise in ancillary diagnostic techniques. Students will be expected to learn to use diagnostic testing regimens as integral parts of comprehensive diagnostic and therapeutic plans. Instruction will consist primarily of the discussion of clinical cases with emphasis on laboratory diagnostics. Students will be expected to lead and participate in these discussions and will be evaluated on their ability to do so.

VTMED 5610 Radiology Service

Fall, winter, spring, and summer. 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. N. L. Dykes and staff.

Two-week clinical experience in the imaging section of the Cornell University Hospital for Animals. Students use radiographic, ultrasonographic, CT, MRI, and nuclear

medicine imaging techniques to evaluate animal patients under treatment in the Cornell University Hospital for Animals. Students obtain and interpret radiographic studies with guidance from radiology faculty and technical staff. Autotutorial teaching films are used to familiarize students with radiographic examples of common diseases of large- and small-animal species. Small-group discussions are scheduled to present and discuss the teaching files and current cases. The safe use of X-ray-producing equipment and radioisotopes is discussed.

VTMED 5611 Small-Animal Clinical Emergency and Critical Care Medicine

Fall, winter, spring, and summer. 2 credits. Prerequisite: third- and fourth-year veterinary students. Letter grades only. N. Dhupa, G. Schoeffler, D. Fletcher, and staff.

Management of both emergent and critical cases represents a significant component of the practice of veterinary medicine. The focus of this clinical rotation is the development of a knowledge base and a comprehensive set of skills necessary for a veterinarian to perform adequately in these areas, within a structured format. These skills include the appropriate evaluation (triage) and stabilization of emergency patients, the management of post-operative and other critical patients, and sensitive and effective client communication. Participants access relevant information from various sources related to emergency and critical care medicine and understand and apply these principles to clinical cases. Students will participate in the management of incoming emergency cases as well as having primary patient care responsibilities in both intensive care and intermediate care units. Students will be expected to work closely with technicians and clinicians to develop familiarity with technical and nursing procedures.

VTMED 5612 Fourth-Year Seminar

Fall and spring. 1 credit. Required component of Clinical Rotations (Foundation Course VI). First-, second-, and third-year students and all faculty and staff members also invited and encouraged to attend. S-U grades only. M. Smith, chair of Senior Seminar Committee.

Gives the student the responsibility and opportunity of selecting and studying a disease entity on the basis of a case or series of cases, or to conduct a short-term, clinically oriented research project under the direction of a faculty member. In either case, an oral report is presented at a weekly seminar. A written report is also submitted within two weeks after the seminar. All participants are encouraged to foster an atmosphere in which discussion, exchange of ideas, and the airing of controversial opinions might flourish.

VTMED 5701 Animals, Veterinarians, and Society (Part A) (Foundation Course VIIa)

Fall. 1.5 credits. Prerequisite: first-year veterinary students. Letter grades only. Fee charged for course guide. Live animals used in course instruction. N. L. Irby, C. McDaniel, and staff.

Complements and augments material learned in VTMED 5100 (Foundation Course I—The Animal Body). The class is divided into small groups and each group meets for four to five hours each week during the first 11 weeks of the fall semester. Using live dogs, cats, horses,

and cows as models for learning how to perform a physical examination, this laboratory course teaches the skills of observation, auscultation, palpation, and percussion as well as related basic diagnostic procedures. The body systems are examined sequentially and follow the order of study in Foundation Course I.

VTMED 5702 Animals, Veterinarians, and Society (Part B: Ethics) (Foundation Course VIIb)

Last part of fall semester through end of winter session. 1 credit. Prerequisite: first-year veterinary students; VTMED 5701. Letter grades only. Lecs average two hours each week; lab, 12 hours spread throughout course. Live animals used in course instruction. N. L. Irby, C. McDaniel, and staff.

Consists of both lectures and laboratory sessions. Lectures partially complement materials learned in VTMED 5200 (Foundation Course II—Cell Biology and Genetics) but for the most part focus primarily on veterinary medical ethical issues related to animal use, animal welfare, genetics counseling, and clinical day-to-day ethics. The laboratory reviews basic equine and bovine husbandry skills and the small-animal physical examination.

VTMED 5703 Animals, Veterinarians, and Society (Part C) (Foundation Course VIIc)

Spring. 1 credit. Prerequisite: first-year veterinary students; VTMED 5702. Letter grades only. Fee charged for course guide. Live animals used in course instruction. N. L. Irby, J. Morrissey, C. McDaniel, and staff.

Introduces students to medical record keeping and to the communication skills and techniques necessary for effective communication with clients. In addition, students are introduced to the human-animal bond and its implications for veterinary medicine, animal death, and grief counseling. This course gives students the opportunity to practice interviewing clients while refreshing their physical exam skills.

VTMED 5704 Animals, Veterinarians, and Society (Part D: Public Health and Preventive Medicine) (Foundation Course VIId)

Fall. 2 credits. Prerequisite: second-year veterinary medical students; VTMED 5703. Letter grades only. Fee charged for course guide. Live animals used in course instruction. N. L. Irby, L. D. Warnick, and staff.

Complements and augments material learned in VTMED 5400 (Block IV—Host, Agent, and Defense). Emphasizes veterinary public health and preventive medicine. Topics include aggressive animals and animal bites, routes of disease transmission, rabies control programs, zoonotic diseases, emerging infectious diseases, environmental health, and preventive health care programs including vaccination protocols in large and small animals.

VTMED 5705 Animals, Veterinarians, and Society (Part E: Introduction to Clinical Procedures) (Foundation Course VIIe)

Spring. 0.5 credit. Prerequisite: second-year veterinary students; VTMED 5704. Letter grades only. Fee charged for course guide. Live animals used in course instruction. N. L. Irby, C. McDaniel, and staff.

Laboratory course that provides a basic introduction to clinical skills students will need when they start their clinical rotations in the Cornell University Hospital for Animals. Includes a brief review of the physical examination of the dog, cat, horse, and cow. Clinical procedures include but are not limited to ear examination and treatment, IM and SQ injections, fluid administration, naso- and orogastric tube placement, urinary catheterization, and IV catheterization.

VTMED 5706 Animals, Veterinarians, and Society (Part F) (Foundation Course VIIf)

Fall. 1.5 credits. Prerequisite: third-year veterinary students; VTMED 5705. Letter grades only. Fee charged for course guide. Live animals used in course instruction. N. L. Irby, C. McDaniel, and staff.

Complements material learned in VTMED 5510 Foundation Course V—Animal Health and Disease. Examines governmental regulation of the veterinary profession, including proper drug usage, extra label drug use (FDA), controlled substances (DEA), professional liability and malpractice insurance, professional and unprofessional conduct, hazardous materials in the workplace (OSHA), and environmental issues (EPA). Also includes sessions relating to the control and prevention of the spread of animal diseases and the role of USDA and specifically APHIS in these regulatory functions. The laboratory component consists of night treatments in the Equine and Farm Animal Hospital.

DISTRIBUTION COURSES

Distribution courses comprise 30 percent of the curriculum and are usually scheduled during the first half of each spring semester. During the first two years, many of the distribution courses are oriented to the basic sciences. During years three and four, students have additional distribution course offerings from which to choose. Some emphasize clinical specialties, whereas others integrate basic science disciplines with clinical medicine and are co-taught by faculty members representing both areas. Students from different classes have the opportunity to take many of these courses together.

Grading options for distribution courses are either letter or S–U.

VTMED 6100 Anatomy of the Carnivore

Spring. 3 credits. Prerequisite: VTMED 5100 or permission of instructor; first-, second-, third-, and fourth-year veterinary students or permission of instructor. Letter grades only. P. S. Maza.

Students study carnivore anatomy by detailed systematic and regional dissection of the cat, with comparison to the dog. Student dissection is supplemented with prosections, radiographs, palpation of live cats, and exercises focusing on surgical approaches. There are opportunities to dissect other carnivores, such as the ferret and the fox, depending on availability of specimens. The lectures augment the laboratory dissection and introduce the student to clinical anatomy of the cat and functional morphological comparative features in the Order Carnivora. Students do an independent project on the carnivore species of their choice and give an oral presentation on this to the class.

VTMED 6101 Anatomy of the Horse

Spring. 3 credits. Prerequisite: first-, second-, third-, and fourth-year veterinary students or permission of instructor. Letter grades only. A. J. Bezuidenhout.

Organized as a traditional anatomy course that relies primarily on students learning the anatomy of horses through hands-on dissection laboratories augmented by lectures and highlighted by clinical correlations. An understanding of anatomy that provides the foundation for surgery and medicine. Its relevance to clinical practice is emphasized by the regional approach to dissection. Most lectures emphasize structural-functional correlations that are unique or important in the horse. Microscopic anatomy is integrated into the course in selected areas to lay a foundation for the later study of pathology or when it reinforces concepts of structure and function that are difficult to understand by a study of the gross anatomy alone (i.e., hoof). Student dissection cadavers are supplemented by skeletal materials, radiographs, models, preserved predissected specimens, and fresh specimens when available. A live horse will be available for palpation.

VTMED 6102 Anatomy of the Ruminant

Spring. 3 credits. Prerequisite: VTMED 5100 or permission of instructor; first-, second-, third-, and fourth-year veterinary students or permission of instructor. Letter grades only. L. A. Mizer.

Covers the regional anatomy of several ruminant species using dissection laboratories and lectures. Emphasizes the functional consequences of structural modifications and anatomical features relevant to clinical practice. Correlates microscopic anatomy with gross anatomy when appropriate to relate structure to function and to provide a foundation for later study in pathology. Student dissection material is supplemented by skeletal materials, radiographs, models, predissected specimens, and postmortem specimens. Students are required to complete an independent study project on a relevant subject of their choice. Assessment includes written and practical exam.

VTMED 6103 Comparative Anatomy: Pattern and Function

Spring. 3 credits. Prerequisite: VTMED 5100; first-, second-, third-, and fourth-year veterinary students or permission of instructor. Letter grades only. J. Hermanson.

The goal of this course is to study anatomical variability among amniote (mammals, birds, and reptiles) and anamniote (amphibian and fish) species. This is accomplished by relating the anatomy of major organ systems in each species to a common basic pattern and considering the differences in a functional perspective. Five major systems are explored (integumentary, locomotory, cardiorespiratory, digestive, and urogenital) in a variety of species as available.

VTMED 6120 Anatomy and Histology of Fish

Spring. 2 credits. Minimum enrollment 4; maximum 6. Prerequisite: first-, second-, third-, and fourth-year veterinary students or written permission of instructor. S–U or letter grades. P. R. Bowser.

Provides an overview of the diversity of anatomy and histology of fish. Students participate in lecture, discussion, and laboratory exercises to review the major organ systems. Extensive use of library resources for assigned readings is expected. Each student

prepares a term project and makes one oral presentation.

VTMED 6198, 6298, 6398, 6498, 6598, 6698, 6798 Special Projects in Veterinary Medicine

Fall, winter, spring, summer. 1–4 credits, variable. S–U or letter grades. Must be arranged with College of Veterinary Medicine lecturer, senior lecturer, or tenure-track faculty member.

Provides students the opportunity to work individually with a faculty member to pursue an area of particular interest and, typically, not part of the established curriculum. Specific course objectives and course content are flexible and reflect the scope and academic expertise of the faculty.

VTMED 6199, 6299, 6399, 6499, 6599, 6699, 6799 Research Opportunities in Veterinary Medicine

Fall, winter, spring, summer. 1–4 credits, variable. S–U or letter grades. Must be arranged with College of Veterinary Medicine lecturer, senior lecturer, or tenure-track faculty member.

Provides students the opportunity to work in the research environment of faculty involved in veterinary or biomedical research. Specific course objectives and course content are flexible and reflect the specific research environment. Research projects may be arranged to accumulate credit toward requirements in Distribution Sets I, II, III, IV, and V.

VTMED 6222 Canine and Feline Medical Genetics

Spring. 2 credits. Minimum enrollment 10; maximum 40. Prerequisites: VTMED 5200, 5300, and 5310. S–U or letter grades. V. N. Meyers-Wallen.

Covers the genetic and pathophysiologic mechanisms underlying inherited diseases in dogs and cats that may be encountered in small-animal practice. Specific disorders of clinical importance are presented in a lecture format to illustrate the distribution, diagnosis, and control of inherited diseases in individuals and populations. Ethical considerations regarding treatment, prevention, and control measures are discussed.

VTMED 6320 Clinical Pathology

Spring. 2 credits. Minimum enrollment 25; maximum 90. Prerequisite: second-, third-, and fourth-year veterinary students. Letter grades only. T. Stokol and D. Schaefer.

Addresses a range of issues related to laboratory medicine and interpretation of laboratory results. General topic areas include hematology, clinical chemistry and immunology, and urinalysis. The primary mode of instruction is student-driven small-group (untutored) exploration of case materials followed by faculty-moderated large-group discussions. Selected lectures and laboratory sessions supplement and expand on issues generated by the case discussions. This course builds on concepts previously addressed in Foundation Courses III and IV and provides additional experiences in practical clinical pathology procedures and microscopy.

VTMED 6321 Management of Fluid and Electrolyte Disorders

Spring. 2 credits. Minimum enrollment 20; maximum 80. Prerequisite: second-, third-, and fourth-year veterinary students. Letter grades only. R. Rawson.

Students focus on clinical manifestations and the pathophysiologic mechanisms associated with fluid, electrolyte, and metabolic acid-base disturbances in domestic animals. The course is divided into segments dealing with salt and water imbalances, potassium, calcium, and phosphate abnormalities, metabolic acidosis, metabolic alkalosis, and mixed acid-base disturbances.

VTMED 6324 Antimicrobial Drug Therapy in Veterinary Medicine

Spring. 1 credit; may be repeated for credit max. of two times. Prerequisite: second-, third-, and fourth-year veterinary students. Letter grades only. W. S. Schwark.

Familiarizes students with antimicrobial drugs used in veterinary practice. Builds on fundamental pharmacological and microbiological principles covered in Foundation Courses III and IV and considers antibacterial, antifungal, antiparasitic, and anticancer drugs from the point of view of unique pharmacokinetic properties, indications for clinical use, and potential toxicities as the basis for rational use.

VTMED 6327 Current Concepts in Reproductive Biology (also BIOAP 7570)

Fall. 3 credits. Minimum enrollment 6. Prerequisite: first-, second-, and third-year veterinary students and appropriate undergraduate/graduate training. Letter grades only. Offered odd-numbered years. J. Fortune, P. A. Johnson, and staff.

For description, see BIOAP 7570.

VTMED 6328 Veterinary Clinical Toxicology

Spring. 2 credits. Prerequisite: second-, third-, and fourth-year veterinary students. S-U or letter grades. K. Bischoff.

Provides veterinary students with a solid introduction to concepts and principles of toxicology and how they are applied in the clinical setting. Students learn about specific common toxicants, clinical signs in affected animals, and treatment protocols for the toxicants in question. Students also gain an understanding of the clinical approach to suspected or unknown toxicoses, sample collection and handling, and resources available for clinical toxicologic problems. The course is conducted with three one-hour lectures per week and one hour-long large-group discussion per week. Grades are based on weekly homework assignments, a midterm, and a final exam.

VTMED 6420 Foreign Infectious Diseases of Animals

Spring. 1 credit. Minimum enrollment 20. Prerequisite: second-, third-, and fourth-year veterinary students. Letter grades only. A. Torres, R. Gilbert, and D. Schlafer.

Describes the etiology, pathogenesis, clinical signs, gross pathology, differential diagnosis, methods of spread, reservoir hosts, and control of the most important foreign and emerging animal diseases that present serious economic threats to the United States. Several foreign and emerging animal diseases are also important zoonoses affecting public health. The recent spread and impact of foot-and-mouth disease, avian influenza virus, bovine spongiform encephalopathy, and chronic wasting disease are good examples of the need to emphasize the importance to practicing veterinarians so they in turn could educate producers, consumers, and the public in general.

VTMED 6421 Epidemiology of Infectious Diseases

Spring. 1 credit. Maximum enrollment 8. Prerequisite: second-, third-, and fourth-year veterinary students. Letter grades only. H. Mohammed and staff.

Introduces the epidemiologic methods used in infectious disease investigations. Also discusses the importance of surveillance systems in detecting modern epidemics and in the development of effective disease prevention and control strategies. Emphasizes understanding the relationships between the host, the agent, and the environment as they relate to disease causation. Explores contemporary epidemiologic methods applicable to old diseases that remain real or potential problems, newly emerging infectious diseases, and nosocomial infections. Selected diseases are discussed to clarify the role of epidemiology in understanding the pathogenesis of infectious processes in individuals and groups of animals. Students have the opportunity to apply the methods learned to actual disease problems and write an epidemiologic report that might lead to a publication in a peer-reviewed scientific journal.

VTMED 6422 Clinical Biostatistics for Journal Readers

Spring. 1 credit. Minimum enrollment 3; maximum 12. Prerequisite: first-, second-, third-, and fourth-year veterinary students or permission of instructor. Letter grades. H. N. Erb.

Students become familiar with the statistical methods commonly used in veterinary clinical articles, learn to recognize obvious misuse of those methods, and become able to interpret the statistical results.

VTMED 6423 Clinical Diagnostic Parasitology

Fall and spring. 0.5 credit for attending eight one-hour parasitology sessions; student usually can easily obtain 2 hours on each of the five participating rotations (Ambulatory, Community Practice Service, Dermatology, Pathology, and Wildlife). Prerequisite: VTMED 5510; third- and fourth-year veterinary students. S-U grades only. A. Lucio-Forester and D. D. Bowman.

Gives students experience in diagnosing parasitic infections. Students perform appropriate parasitological testing methods on clinical samples from patients on their rotation. They also evaluate the test results in terms of treatment or management of the infections. If clinical specimens are not available, appropriate materials are provided for study and evaluation. Ambulatory students typically do qualitative and quantitative floatations on samples from large-animal cases they have encountered that week. In CPS, one hour is spent testing samples from current dog and cat patients, while a second hour is devoted to a discussion of the treatment of common endo- and ecto-parasites. Pathology students typically examine and identify intact parasites they retrieved from various organs at necropsy. This course is considered to be a logical extension to Foundation Course IV: Host, Agent, and Defense, and is expected to build on the didactic material presented in Large- and Small-Animal Parasitology.

VTMED 6424 Approaches to Problems in Canine Infectious Diseases

Spring. 1 credit. Minimum enrollment 10; maximum 80. Prerequisite: second-, third-, and fourth-year veterinary students. Letter grades only. S. C. Barr.

Emphasizes the clinical aspects of the more common canine infectious diseases. The overall objective is to provide details about specific infectious diseases a future small-animal practitioner may need to know to effectively diagnose and treat these diseases. Clinical signs, presentation, clinicopathologic data, diagnostic choices, treatment plans, and prevention are emphasized. Most lectures are presented by clinical faculty and therefore the material is oriented toward practical skills in managing clinical cases. Grading is based entirely on the result of a written exam (usually multiple-choice format) given in the final period.

VTMED 6425 Shelter Medicine I

Spring. 1 credit. Minimum enrollment 5; maximum 40. Prerequisite: VTMED 5400; third- and fourth-year veterinary students. Letter grades only. J. M. Scarlett and staff from American Society for Prevention of Cruelty to Animals.

Shelter medicine is a new and exciting discipline in veterinary medicine. Caring for animals in animal shelters requires a "herd health" as well as an individual animal perspective. This course addresses the role of veterinarians working with and for animal shelters, the principles of preventive medicine and population health in companion animals; behavioral enrichment, temperament testing, and diagnosis and treatment of behavior problems in shelter animals; design and implementation of high volume spay/neuter programs for shelters; design and implementation of trap/neuter/release programs by shelters; and the medical management of common infectious diseases in shelter cats and approved methods of euthanasia for companion animals. This is the second course in a three-course sequence.

VTMED 6426 Timely Topics in Veterinary Parasitology: Large-Animal

Spring. 0.5 credit. Minimum enrollment 2. Prerequisite: third- and fourth-year veterinary students. S-U grades only. D. D. Bowman.

In-depth look at one or a few parasites of special interest relative to large-animal medicine. Presents details of taxonomy, biology, epidemiology, clinical presentation, and preventive and curative treatment. Efforts are made to discuss those aspects of the disease as it relates to the practical control of these and in-depth coverage of primary literature relating to the parasite being discussed. Topics vary annually. The course is presented in a lecture/discussion format.

VTMED 6427 Timely Topics in Veterinary Parasitology: Small-Animal

Spring. 0.5 credit. Minimum enrollment 2. Prerequisite: third- and fourth-year veterinary students. S-U grades only. D. D. Bowman.

In-depth look at one or a few parasites of special interest relative to small-animal medicine. Presents details of taxonomy, biology, epidemiology, clinical presentation, and preventive and curative treatment. Efforts are made to discuss those aspects of the disease as it relates to the practical control of these and in-depth coverage of primary

literature relating to the parasite being discussed. Topics vary annually. The course is presented in a lecture/discussion format.

VTMED 6428 Vaccines: Theory and Practice

Spring. 1 credit. Minimum enrollment 10. Prerequisite: introductory immunology course or VTMED 5400 or VETMI 3150; second-, third-, and fourth-year veterinary students and graduate students or others by permission of instructor. Letter grades only. Offered odd-numbered years. T. Clark.

Broad overview of vaccines and immunization program used in contemporary veterinary medicine, focusing on efficacy use and safety. One take-home final exam.

VTMED 6429 Infectious Diseases and Management of Swine

Spring. 2 credits. Minimum enrollment 6; maximum 80. Prerequisite: second-, third-, and fourth-year veterinary students. S-U or letter grades. K. Earnest-Koons.

Provides veterinary students with a solid introduction to concepts and principles of swine infectious diseases and how they are treated in the clinical setting. Students learn about specific infectious diseases, clinical signs in affected animals, and treatment protocols for the diseases in question. Students also gain an understanding of the clinical approach to suspected or unknown infectious agents, sample collection and handling, and resources available for infectious disease diagnosis. Good management practices for swine farmers are also reviewed and their relationship to disease is discussed. The course is conducted with three one-hour lectures per week and one hour-long large group discussion per week. Meets two days per week for one hour and one day per week for two hours. Grades are based on weekly quizzes, a final exam, a short paper, and attendance/participation.

VTMED 6430 Veterinary Perspectives on Pathogen Control in Animal Manure (also BEE/BIOMI 6430)

Spring. 2 credits. Prerequisite: third- and fourth-year veterinary students, graduate students, advanced undergraduate students interested in agricultural engineering as related to animal manure management. Letter grades only. D. D. Bowman.

In-depth look at the management of pathogens in animal manures. Reviews the pathogens involved, the role of governing agencies, the survival of pathogens in the field, and methods of pathogen destruction. Discusses commercial methods of manure processing for the control of these pathogens for the protection of other animals and the human population. Concludes with class discussions with major stakeholders representing the dairy, beef, pork, and poultry industries and their understanding of the problem as it relates to veterinary students.

VTMED 6432 Fish Health Management

Spring. 1.5 credit. Minimum enrollment 8; maximum 16. Prerequisite: first-, second-, third-, and fourth-year veterinary students or written permission of instructor. S-U or letter grades. P. R. Bowser.

Lecture and laboratory course providing an overview of the aquatic environment and the important infectious and noninfectious diseases of fish. Covers important diseases encountered in commercial aquaculture, aquarium systems, and natural waters. The laboratory is designed to provide students

with a knowledge base and hands-on diagnostic experience in diseases of fish. Students also maintain and manage aquarium systems during the course to gain an appreciation for the science behind the operation of those systems. The laboratory requires time outside the normal scheduled class sessions (to be scheduled by the students) for management of the aquarium systems. Each student also makes a presentation on a topic in aquatic animal health during the course.

VTMED 6433 Anaerobic Infections of Animals

Spring, two 1-hr. lec per week for eight weeks. 1 credit. Minimum enrollment 10; maximum 80. Prerequisite: VTMED 5400. S-U grades only. P. L. McDonough and staff.

Presents anaerobic infections in clinical context as an adjunct to the material covered in Foundation Course IV. Students gain an understanding of the diversity and biology of anaerobic bacteria and the niches that they occupy in the animal and avian body. A basic, clinically oriented taxonomy is presented, and students learn about the virulence and pathogenesis of the major anaerobes that they will encounter in clinical practice. The clinical signs of anaerobic infections, laboratory identification and susceptibility testing, and the use of specimen transport media are also covered. Treatment of common infections, including wound care, is covered and vaccines currently available are discussed in detail. In the second four weeks of the course, students learn about the major clinical syndromes caused by anaerobes.

VTMED 6434 Shelter Medicine II

Spring. 1 credit. Minimum enrollment 3; maximum 20. Prerequisite: third- and fourth-year veterinary students. Highly recommended: VTMED 6425. Letter grades only. J. M. Scarlett.

Intended as a sequel to the Issues and Preventive Medicine in Animal Shelters course offered in the C Distribution block. In light of the time constraints in the Issues course, the principles of prevention and control to specific diseases (e.g., ringworm, kennel cough) commonly encountered in small-animal populations are not discussed. This course encourages students to apply principles of infectious disease, epidemiology, and preventive medicine to infectious disease problems in small-animal populations, with a particular emphasis on disease problems in shelters. Mention of modification to fit other small-animal populations (e.g., catteries, kennels) is made.

VTMED 6435 Forensic Science for Marine Biologists (also BIOSM 4450)

Summer. 2 credits. Held at Shoals Marine Laboratory. By application through Shoals Marine Laboratory. Maximum enrollment 21. Prerequisite: satisfactory completion of a year of college-level biology, ecology, or marine science. S-U or letter grades. Special fee required. P. R. Bowser. For description, see BIOSM 4450.

VTMED 6521 AQUAVET II: Comparative Pathology of Aquatic Animals

Two weeks of full-time instruction at Woods Hole, Mass., immediately after spring semester. 2 credits. Maximum enrollment 18. Prerequisites: formal course work in diseases of aquatic animals or appropriate experience and permission of instructor.

S-U or letter grades. Fee charged. Available by competitive application process to veterinary and graduate students. P. R. Bowser.

Advanced course (sponsored by Cornell U., the U. of Pennsylvania, and three marine-science institutes at Woods Hole: the Marine Biological Laboratory, Woods Hole Oceanographic Institution, and Northeast Center of the National Marine Fisheries Service) covering the comparative pathology of aquatic invertebrates and vertebrates commonly used as laboratory animals. The material presented consists of discussions of the diseases of aquatic animals as well as extensive use of the microscope to examine the histopathology associated with these diseases. The course is taught by an invited faculty of 12 individuals who are leaders in their respective fields of aquatic-animal medicine.

VTMED 6522 Diseases of Birds

Spring. 2 credits. Minimum enrollment 10; maximum 80. Prerequisite: second-, third-, and fourth-year veterinary students. Letter grades only. G. V. Kollias and staff.

Designed to introduce second-, third-, and fourth-year veterinary students to a basic and practical knowledge of the most common infectious and noninfectious diseases affecting a variety of avian species. Emphasizes the latest diagnostic and control approaches. The course format is a combination of didactic lectures and discussions.

VTMED 6524 Feline Infectious Diseases

Spring. 1 credit, two 50-min. lec each week for eight weeks. Minimum enrollment 10; maximum 80. Prerequisite: second-, third-, and fourth-year veterinary students. Letter grades only. S. C. Barr.

Emphasizes the clinical aspects of feline infectious diseases common to cats in North America and complements knowledge acquired in Foundation Courses IV and V. The overall objective is to provide details about specific infectious diseases a future small-animal practitioner may need to know to effectively diagnose and treat diseases. Etiology, epidemiology (prevalence and transmission), pathogenesis, clinical findings, diagnosis, pathologic findings, therapy prevention, and public health considerations are emphasized. Most lectures are presented from a clinician's point of view, and therefore the material is oriented toward practical skills in managing clinical cases. Grades are based entirely on the result of a written exam (usually multiple-choice format) given in the final period.

VTMED 6525 Osteoarthritis

Spring. 1 credit. Minimum enrollment 8; maximum 24. Prerequisite: graduate and second-, third-, and fourth-year veterinary students. Letter grades only. G. Lust.

Provides a basis at the molecular, cellular, and tissue levels for understanding the function of mammalian diarthrodial joints. Includes a description of a diarthrodial joint and the composition and metabolism of articular cartilage, subchondral bone, ligaments, meniscus, capsule, and synovium. Considers the interrelationships of synovium, synovial fluid, articular cartilage, joint lubrication, biomechanical considerations, and enervation. Canine hip dysplasia is a focus during the early class sessions. The osteoarthritis associated with canine hip dysplasia serves as a basis for discussion of the etiopathogenesis of the disease. Canine osteoarthritis is

emphasized, but the diseases in other animals such as mice, guinea pigs, rabbits, cats, and horses are mentioned. Therapies such as nonsteroidal anti-inflammatory drugs, glucocorticoids, and others may be discussed.

VTMED 6526 Veterinary Nutrition

Spring. 2 credits. Minimum enrollment 10; maximum 90. Prerequisite: second- and third-year veterinary students or permission of instructor. Recommended for second- and third-year veterinary students. Letter grades only. J. Wakshlag.

The first half of this course provides information on the requirements for and metabolic uses of the essential nutrients of companion animals as well as on formulation and evaluation of practical rations for species of veterinary interest. These concepts are applied in discussion of life stage nutritional needs, including growth, adult maintenance, gestation, lactation, aging, performance, and production. The second half covers clinically relevant diseases of nutritional deficiency and excess, including obesity, as well as the role of nutrition in the management of diseases of the various organ systems—e.g., renal, lower urinary tract, cardiac, G-I, hepatic, and musculoskeletal system disease. Other topics include the role of nutrition in managing cancer and hypersensitivity disorders and in critical care, including enteral and parenteral nutrition. The course also includes an introduction to nutrition for exotic and zoo animals.

VTMED 6527 Veterinary Aspects of Captive Wildlife Management

Spring. 2 credits. Minimum enrollment 10; maximum 40. Prerequisite: first-, second-, third-, and fourth-year veterinary students. Letter grades only. G. V. Kollias.

Concentrates on principles of captive wildlife management, both clinical and nonclinical. Students are challenged to learn and integrate a variety of disciplines that are essential to managing wildlife successfully in a captive or semi-free-ranging environment. These disciplines include but are not limited to species-specific (1) behavior and behavioral requirements, (2) nutritional requirements and problems, (3) natural history, (4) zoonotic and toxicological problems, (5) manual restraint and anesthesia, (6) preventive medicine, and (7) medical and legal ethics. In even-numbered years the course emphasizes non-North American wildlife species (e.g., African, Asian, Australian, and Central and South American species). Format includes lectures and student presentations. In odd-numbered years it focuses more on the North American (native) wildlife species, presented in lectures and laboratories.

VTMED 6528 Equine Surgical and Anesthetic Techniques

Winter, one-week period over winter intersession. 1 credit. Minimum enrollment 3; maximum 21. Enrollment by lottery. Prerequisite: VTMED 6101; priority given to students who have indicated career interest in equine medicine and surgery; third- and fourth-year veterinary students. S-U grades only. S. Fubini (coordinator) and other large-animal surgeons.

Consists of five laboratories performing surgical procedures on ponies and cadaver specimens. It is the intent of this course not to make the students proficient in these procedures but to familiarize them with some specialized surgical techniques and to make them more

enlightened referring practitioners. The course, therefore, is intended for students anticipating equine practice after graduation.

VTMED 6529 Food-Animal Surgical and Anesthetic Techniques

Winter, one-week period over winter intersession. 1 credit. Minimum enrollment 6; maximum 21. Enrollment by lottery. Prerequisite: VTMED 6103; priority given to students who have indicated career interest in farm animals; third- and fourth-year veterinary students. S-U grades only. S. Fubini and other large-animal surgeons.

Consists of five laboratories performing surgical procedures on sheep, calves, cadaver specimens, and adult cattle. It is the intent of this course not to make the students proficient in these procedures but to familiarize them with surgical techniques and to make them more enlightened referring practitioners. The course, therefore, is intended for students anticipating food-animal practice after graduation.

VTMED 6530 Llama Tutorial

Fall, spring, summer. 1 credit. Prerequisite: VTMED 5400; second-semester second-, third-, and fourth-year veterinary students. S-U grades only. Independent study. M. C. Smith.

Autotutorial or group tutorial course covering common problems of llamas and alpacas. Participants are provided with study guides consisting of brief case descriptions and sample study questions. Reference is made to textbooks, journal articles, videotapes, and (if available) a teaching llama or alpaca to assist students in finding the answers to the questions efficiently. Grading is based on an oral exam.

VTMED 6531 Poisonous Plants

Fall. 1 credit. Prerequisite: first-, second-, third-, and fourth-year veterinary students or permission of instructor. S-U grades only. M. C. Smith.

Field trips demonstrate toxic plants growing in natural or cultivated settings. Lectures address economically important poisonous plants native to the United States. Information presented includes plant identification, natural habitat, toxic principles, clinical signs of toxicity, and treatment and prevention of poisoning in animals. Some of the major toxic principles found in plants and considered in detail in the course are nitrates, cyanide, oxalates, photodynamic agents, alkaloids, and mycotoxins.

VTMED 6532 Avian Medicine and Surgery

Spring. 2 credits. Minimum enrollment 20; maximum 40. Prerequisite: third- and fourth-year veterinary students. Letter grades only. Live birds used in some laboratories. G. V. Kollias and staff.

Designed to introduce third- and fourth-year veterinary students to the principles and practice of clinical avian medicine and surgery. The course is taught in a basic didactic lecture and discussion format with laboratories that reinforce concepts presented in the lectures.

VTMED 6533 Advanced Equine Lameness

Spring. 2 credits. Minimum enrollment 7; maximum 21. Enrollment by lottery. Prerequisite: third- and fourth-year veterinary students. Letter grades. Live animals used for learning. N. Ducharme, A. Nixon, R. Radcliffe, L. Fortier, and staff. Designed to teach students the methodology of equine lameness diagnosis. Places a strong

emphasis on a hands-on approach to learning and is primarily laboratory-based. During laboratories, students work in small groups on live horses to diagnose the cause of their lameness. To this end, students learn both the practical skills, such as perineural and intra-articular blocks, as well as the methodology necessary to systematically work up a lameness case. Laboratories also provide students with the opportunity to practice field radiography and gain ultrasound skills as they pertain to equine lameness. Additionally, students have the opportunity to practice basic farrier skills. Lecture topics are intended to round out the students' understanding of lameness by providing them with a knowledge base of the common causes of lameness, organized by response to local anesthesia. Imaging interpretation is emphasized through case discussions. The course is recommended for students anticipating entry into equine practice. Students seeking hands-on experience with horses are also welcome.

VTMED 6534 Equine Reproduction

Spring. 2 credits. Minimum enrollment 8; maximum 20. Enrollment by lottery. Prerequisite: third- and fourth-year veterinary students. Lab corequisite: enrollment in lec. Letter grades only. M. A. Coutinho da Silva.

Covers advanced aspects of equine reproductive physiology. Discusses reproductive management of mares and stallions using natural and artificial breeding strategies. Stresses diagnosis, treatment, and prevention of common reproductive disorders. The laboratory component builds on skills acquired during foundation courses and provides experience in techniques important in equine theriogenology.

VTMED 6536-6537 Advanced Dairy Reproduction

Spring. 6536, lec; 6537, lab. Lec, 1 credit; lab, 1 credit. Minimum lab enrollment 12; maximum 24. Lab enrollment by lottery. Prerequisite: third- and fourth-year veterinary students. Lecture and lab corequisite: enrollment in both lecture and lab components. Letter grades only. R. Gilbert.

Offers lectures and labs that provide both theoretical and practical training in current approaches to the veterinary aspects of dairy-cow reproductive care and management. The aim is to empower the student with entry-level, current knowledge and skills for the reproductive aspects of any modern dairy practice.

VTMED 6538 Special Problems in Equine Medicine

Spring. 0.5 credit. Minimum enrollment 10; maximum 30. Enrollment by lottery. Prerequisite: third- and fourth-year veterinary students. S-U grades only. T. Divers and staff.

Intended for students anticipating equine practice. In-depth study of important diseases, review of recent literature, health management, and hands-on procedures or demonstrations are the core of this course.

VTMED 6539 Disorders of Large-Animal Neonates

Spring. 1 credit. Minimum enrollment 10; maximum 100. Prerequisite: first-, second-, third-, and fourth-year veterinary students. Letter grades only. G. Perkins.

Introductory neonatology course. The emphasis is on the medical and surgical problems of foals in the early neonatal period with some information presented about calves, small ruminants, and camelid neonates. Students also spend several hours in the neonatal intensive care unit providing medical care of hospitalized patients under staff supervision.

VTMED 6540 Equine Soft-Tissue Surgery

Spring. 1 credit. Minimum enrollment 6; maximum 24. Enrollment by lottery. Prerequisite: third- and fourth-year veterinary students. Letter grades only. R. Hackett and staff.

Intended for students anticipating equine practice after graduation. Builds on material presented in the foundation courses to provide supplemental instruction in surgical disorders of the horse. Lectures are case-based and emphasize disorders likely to be encountered in equine practice (colic, traumatic injuries, upper respiratory tract disorders, prepurchase examination). Laboratories emphasize diagnostic and therapeutic procedures in which an entry-level equine practitioner should be competent.

VTMED 6541 Surgical Pathology

Spring, summer, fall. 1–2 credits, variable; one or two weeks, approx. eight hours per day for 1 credit per week. Prerequisite: second-, third-, and fourth-year veterinary students by permission of instructor. Letter grades only. S. McDonough.

Provides hands-on experience in the Surgical Pathology Service of the Department of Biomedical Sciences. Working with the attending pathologist, students examine tissue specimens histologically, propose diagnoses, and discuss their interpretations. Students may enroll in this course only through the Office of Student Records *within the official add/drop period*. All requests to enroll must be accompanied by the Supplemental Enrollment Form indicating Dr. McDonough's approval of the enrollment and the amount of credit to be awarded. *Second-year students* should not enroll for any term other than summer *unless* they have actually reserved a January or spring-break slot through Dr. McDonough.

VTMED 6542 Medical and Surgical Problems of Dairy Cattle: Emphasis on the Individual Animal

Spring. 1 credit. Minimum enrollment 6; maximum 28. Prerequisite: third- and fourth-year veterinary students. Letter grades only. S. Fubini and staff.

Provides students who have a special interest in dairy practice the opportunity for in-depth discussions of special problems in bovine medicine and surgery. Emphasizes case discussions, physical examination techniques, and ethical and practical matters. Emphasizes individual cow treatment.

VTMED 6543 Special Problems in Small-Animal Medicine

Spring. 1 credit. Minimum enrollment 10; maximum 40. Prerequisite: third- and fourth-year veterinary students. S–U grades only. K. Simpson (coordinator) and staff.

Students work through selected problems in small-animal medicine in two-hour weekly seminars. The focus is on the medical problems associated with cases using historic, clinical, clinical pathologic, and pathologic findings to elucidate basic pathophysiological principles of disease. The overall objective is to give future small-animal practitioners skills

in the approach to clinical problems with specific emphasis placed on history taking, clinical signs and examination skills, assessment of clinical pathology data and diagnostic materials (radiographs, ultrasounds), treatment plans, and prevention. The course expands knowledge gained in Foundation Course V and, under the instruction of a clinical faculty member, is aimed at facilitating the use of that knowledge into the practical skills of managing clinical cases.

VTMED 6544 Practice Management

Spring. 2 credits. Prerequisite: third- and fourth-year veterinary students. S–U grades only. M. Kraus, J. Ludders, J. Morrisey, and K. Cummings.

Professional practice and financial managers teach veterinary medical students the essential elements of a successful practice, concentrating on management and organizational skills. Topics include basic practice organization, leadership styles, career planning, communication skills, facility management, human resource management, marketing, building and maintaining clients, practice growth, personal finances, money management, insurance, animals and the law, malpractice, medical records, inventory and pharmacy management, and contracts.

VTMED 6545–6546 Sheep and Goat Medicine

Spring. 6545, lec; 6546, lab. Lec, 1 credit; lab, 0.5 credit. Prerequisite: third- and fourth-year veterinary students. Lab corequisite: Sheep and Goat Medicine lec. S–U grades only. M. C. Smith.

Discusses diagnosis, treatment, and prevention of medical and surgical problems of individual small ruminants and of sheep and goat herds. Basic information on breeds, behavior, nutritional requirements, and management systems is supplied. Economically important contagious or metabolic diseases are discussed in depth. The diagnostic evaluation and differential diagnoses for common clinical presentations such as skin disease, neurologic disease, lameness, and mastitis are considered. Herd monitoring of economically important parameters and necropsy diagnosis of abortions and neonatal losses are addressed. Breeding systems, pregnancy diagnosis methods, correction of dystocia, and common surgical procedures are discussed and demonstrated in laboratory sessions.

VTMED 6547 Clinical Ophthalmology

Spring. 0.5 credit. Prerequisite: third- and fourth-year veterinary students. S–U grades only. R. Riis, N. Irby, and T. Kern.

The principles and practice of entry-level veterinary ophthalmology introduced in Foundation Course V, Introduction to Veterinary Ophthalmology, are supplemented by lectures and discussions that emphasize species differences, basic surgical decision-making, and recognition of ocular conditions appropriate for referral. One of the four class periods is devoted to ocular surgical techniques performed on cadaver tissues.

VTMED 6548 Dairy Production Medicine

Fall. 2 credits. Minimum enrollment 6; maximum 14. Prerequisite: third- and fourth-year veterinary students. S–U grades only. C. Guard.

Intermediate course in techniques and procedures used by veterinarians in modern dairy practice. Many of these activities fall outside the traditional boundaries of medicine,

surgery, and theriogenology and might include housing, facilities, manure management, and employee education. Data analysis, disease and productivity monitoring, and evaluation of deviations from targeted performance are used to plan cost-effective interventions or corrections, followed by continued surveillance to monitor their effect. Students are introduced to the dominant software currently used in dairy management. Local dairy herds serve as additional laboratories for class projects.

VTMED 6550 Clinical Pharmacology

Spring. 0.5 credit; may be repeated for credit max. of two times. Prerequisite: third- and fourth-year veterinary students. S–U grades only. W. S. Schwark.

Offered after Foundation Courses I–V and formal exposure to pharmacology course work is completed. The course is designed to familiarize students with drug use in the clinical setting and uses ongoing cases in the Cornell University Hospital for Animals as a teaching tool. Pharmacological concepts are emphasized, with a focus on the rationale for drug choice, alternative drug choices available, pharmacokinetic considerations, and potential drug interactions/toxicities. This course is offered at the time students are about to embark on their clinical rotations. It is designed to emphasize practical aspects of pharmacology in the clinical setting, using basic concepts obtained during formal course work. The onus is placed on the student to explain/rationalize drugs employed in clinical cases in the teaching hospital.

VTMED 6551 Topics in Veterinary Emergency and Critical Care Medicine

Spring. 1 credit. Minimum enrollment 20. Prerequisite: third- and fourth-year veterinary students; for all others, permission of instructor. S–U or letter grades. D. Fletcher.

This course builds upon the foundation built in Block V. It will consist of a combination of lecture and case discussion sections. Although all of the discussions will center on small animal medicine, the same principles often apply to both small animal and large animal situations. Topics that MIGHT be covered include a selection from the following list: shock, trauma, stabilization, cardiopulmonary resuscitation, respiratory emergencies, cardiac emergencies, endocrine emergencies, acute renal failure, hematologic emergencies, transfusion medicine, respiratory monitoring, hemodynamic monitoring, acute abdomen, emergency surgical procedures, and sepsis. The class will focus on both emergency stabilization and management of critically ill patients.

VTMED 6554 Reptile and Amphibian Medicine and Surgery

Spring. 1.5 credits. Minimum enrollment 10; maximum 40. Prerequisite: third- and fourth-year veterinary students or graduate students. Letter grades only. G. V. Kollias.

Designed to introduce veterinary students to the basic principles and practice of reptile and amphibian husbandry, management, diseases and medicine, and surgery.

VTMED 6555 Dairy Business Management and Health Economics

Spring. 2 credits. Minimum enrollment 5; maximum 18. Prerequisite: second-, third-, and fourth-year veterinary students. Letter grades only. L. Warnick and C. Guard.

This course helps veterinary students understand basic principles of dairy economics and business management and develop specific skills used by veterinarians in health economic decision making. Three main topic areas are covered: (1) overview of dairy economics from regional and national perspectives; (2) the terminology and concepts used in dairy business financial analyses and economic decision-making; (3) dairy health economics, including the application of economic tools to decisions related to disease treatment, health maintenance, and productivity.

VTMED 6556 Dairy Herd Health Epidemiology

Spring. 1 credit. Prerequisite: third- and fourth-year veterinary students. Letter grades only. L. D. Warnick, D. V. Nydam, and Y. T. Grohn.

Veterinarians are increasingly asked to advise dairy producers on productivity and management decision-making. This course addresses the relationships of dairy cattle diseases with herd-performance parameters. Through a combination of lectures and laboratory exercises, students learn analytic techniques and computer software skills to evaluate dairy herd disease and production problems. Topics include (1) how often production diseases occur and when; (2) how they are interrelated; (3) the impact of disease on milk production, reproductive performance, and risk of culling; and (4) how to use this information in production medicine.

VTMED 6557 Exotic Small Mammals as Pets

Spring. 1.5 credits. Maximum enrollment 80. Prerequisite: third- and fourth-year veterinary students and graduate students. Students enrolled in VTMED 6603 encouraged to enroll. Letter grades only. J. K. Morrisey.

Concentrates on the husbandry, clinical presentation, diagnosis, and treatment of common diseases of nontraditional small mammals that are kept as pets. These species include ferrets, rabbits, guinea pigs, chinchillas, rats, mice, hamsters, gerbils, hedgehogs, sugar gliders, and other animals. Grading is based on a midterm and final exam. Information regarding these species in the laboratory setting will also be discussed.

VTMED 6559 Applied Dairy Nutrition for Practitioners

Spring. 2 credits. Minimum enrollment 5; maximum 25. Prerequisite: veterinary students or permission of instructor. S-U grades only. D. Nydam, T. Overton, and others.

Provides a foundation in the principles of dairy cattle nutrition for veterinary students interested in dairy production medicine. Emphasizes integration of the principles of dairy cattle nutrition with practical rational formulation with troubleshooting on dairy farms, both preventive and curative.

VTMED 6560 Small-Animal Veterinary Dentistry

Spring. 0.5 credit. Prerequisite: second-, third-, and fourth-year veterinary students who have completed Block III. S-U grades only. J. Rawlinson.

This is an introductory-level course in small-animal dentistry. Students will complete an online auto-tutorial course that covers the basics of oral examination, dental radiography,

oral pathology, and treatment options in the disciplines of oral surgery, periodontology, endodontics, orthodontics, restorative dentistry, and prosthodontics. This will be complimented by eight nonmandatory one-hour question-and-answer sessions and two mandatory three-hour laboratories covering oral examination, dental radiography, basic periodontology, and simple and advanced extractions.

VTMED 6561 Advanced Imaging: Cross Sectional and Functional Modalities

Spring. 1 credit. Minimum enrollment 20; maximum 80. Prerequisite: VTMED 6501. Letter grades only. M. Thompson, N. Dykes, and P. Scrivani.

Elective course designed to complement Block V Distribution course in a lecture and laboratory format designed to introduce veterinary students to nonradiographic imaging modalities including ultrasound, CT, MRI, and nuclear scintigraphy. Content includes discussion of neuroimaging, abdominal ultrasound, and functional imaging of bone, thyroid, kidney, and liver. A focus on recognition of appropriateness of examination and modality will be emphasized. The course focuses on conditions affecting dogs and cats.

VTMED 6562 Animal Pain: Recognition, Prevention, and Treatment in the 21st Century

Spring. 1 credit. Minimum enrollment 10; Maximum enrollment 30 (80). S-U grades only. A. Looney, J. Ludders, L. Campoy, B. Horne, and R. Glead.

This elective course will form the foundation of veterinary pain physiology, pathophysiology, assessment, treatment, and prevention for companion and farm animals. Emphasis will be placed on pharmacologic and nonpharmacologic treatment of acute pain, surgical pain, and chronic pain typical of cancer, degenerative diseases, and surgical or traumatic disease in small animals, horses, and food and farm animals. Final project will utilize either case-based or problem-based critical literature review to benefit students' understating of pain recognition and treatment in animal patients.

VTMED 6600 Theriogenology Service

Spring. 2 or 4 credits. Maximum enrollment 5 per rotation. Prerequisite: VTMED 5510; third- and fourth-year veterinary students. Letter grades only. S. Bedford, M. DaSilva, and staff.

Exposure to clinical procedures in theriogenology as provided by Cornell University Hospital for Animals patient load and augmented by teaching herd animals. Clinical techniques taught include palpation and ultrasound evaluation, artificial insemination and pregnancy diagnosis in mares; semen collection and evaluation in stallions; and foaling monitoring and neonatal foal care. Additionally, students get exposure to breeding management and assisted reproduction in mares at the Equine Park and to theriogenology clinical cases and emergencies in CUHA comprising all equine, camelid, and canine species.

VTMED 6601 Cardiology Service

Fall and spring. 2 credits. Minimum enrollment 1 per rotation; maximum 2. Prerequisite: VTMED 5510; third- and fourth-year veterinary students. Letter grades only. S. Moise and staff.

Provides students with the opportunity to put into practice what they have learned in the

foundation years. The management of the most common cardiac diseases is emphasized, including congestive heart failure, arrhythmias, and secondary cardiac diseases. All species are examined, large and small, although the majority are small animals. Diagnostics, including cardiovascular physical examination, electrocardiography, radiography, and echocardiography, are taught. The rotation includes clinical work, didactic teaching, and self-initiated digging for information.

VTMED 6602 Laboratory-Animal Medicine

Fall and spring. 2 credits. Maximum enrollment 2 per rotation. Prerequisite: VTMED 5510; third- and fourth-year veterinary students. Letter grades only. M. Martin.

The practice of laboratory-animal medicine requires a combination of preventive programs, clinical skills, knowledge of various species' biologies, familiarity with research methodology, and acquaintance with state and federal regulations. This course is an introduction to that specialty. Students accompany laboratory-animal veterinarians on clinical rounds of Cornell's research-animal housing and participate in laboratory diagnostic work. Review sessions are conducted on the biology, medicine, pathology, and husbandry of rodents, rabbits, and primates and on current legislation regulating the care and use of research animals. The course may include field trips to other institutions.

VTMED 6603 Clinical Wildlife-, Exotic-, and Zoo-Animal Medicine

Fall, winter, spring, summer. 2 credits. Maximum enrollment 3 per rotation (plus one intern or extern). Prerequisite: VTMED 5510; third- and fourth-year veterinary students. Letter grades only. G. V. Kollias and staff.

Introduces students to primary medical care of nontraditional pet species, zoo animals, and native wildlife. Students, directly supervised by the attending clinician, are responsible for the assessment, physical examination, and medical management of exotic animal species presented to the Cornell University Hospital for Animals. Other opportunities available to assist in the development of clinical skills in wildlife-, zoo-, and exotic-animal medicine include the wildlife clinic cases at the Cornell Wildlife Health Center, ongoing wildlife research and service projects, and trips to the Rosamond Gifford Zoo. Successful completion of the course requires satisfactory performance during this 14-day clinical rotation.

VTMED 6604 Quality Milk

Fall. 2 credits. Prerequisite: VTMED 5510; third- and fourth-year veterinary students. Letter grades only. R. Gonzalez and QMPS staff.

Covers the causes, diagnosis, treatment, and prevention of bovine mastitis. Stresses the role of management practices. Includes lectures, readings, discussions, laboratory exercises, and farm visits as part of the Quality Milk Production Services. Participants are expected to complete a case study on a dairy farm with udder-health problems and present their findings to the producer and farm personnel. Grading is on performance during the course and a final exam.

VTMED 6605 Special Opportunities in Clinical Veterinary Medicine

Fall, spring, and summer. Prerequisite: VTMED 5510; third- and fourth-year veterinary students. S–U grades only. W. Miller and N. Ducharme.

Provides opportunities for students finished with Foundation Course V to explore professional areas not available through the regular curriculum. Blocks of two to four weeks are usually spent at other teaching hospitals, research laboratories, or zoological facilities. Student proposals are submitted to the assistant dean for learning and instruction for review and approval. Onsite supervisors of the block are required to evaluate each student formally.

VTMED 6607 Poultry Medicine and Production Rotation

Fall, two-week rotation that takes place at University of St. Hyacinthe or University of Guelph in alternating years. 2 credits. Prerequisite: VTMED 5510; third- and fourth-year veterinary students.

Recommended: VTMED 6522. K. A. Schat.

Provides an introduction in practical poultry medicine by a combination of lectures, discussions, and laboratory sessions including postmortem examinations. Students also visit hatcheries, broiler, layer, and turkey farms.

VTMED 6608 Clinical Oncology

Fall and spring. 2 credits. Maximum enrollment 4 per rotation. Prerequisite: VTMED 5510; third- and fourth-year veterinary students. Letter grades only. K. M. Rassnick and staff.

Management and prevention of cancer in companion animals represents a significant component of the practice of veterinary medicine. The focus of this clinical rotation is the development of a comprehensive set of skills necessary for a veterinarian to become an advocate for the client/patient with cancer. These skills include appropriate initial evaluation of animals with cancer; sensitive and effective client and referring-veterinarian communication; ability to access relevant information from numerous sources related to cancer management; and ability to understand and apply principles of surgical, medical, and radiation oncology as well as techniques specifically related to minimize pain and treatment-related effects in cancer patients.

VTMED 6609 Animal Behavior Clinic

Fall, winter, spring, and summer. 2 credits. Maximum enrollment 2 per rotation. Prerequisite: VTMED 6731; third- and fourth-year veterinary students. S–U grades only. K. A. Houpt and staff.

Students participate fully in the Animal Behavior Clinic: answering telephone, mail, and e-mail inquiries, observing and taking charge of behavior cases. To answer inquiries, the student is expected to consult several behavioral textbooks or other sources. Taking charge of the cases includes reading the entire behavioral history, interviewing the owner, forming a diagnosis, conferring with Dr. Houpt or a behavioral resident as to the proper behavioral and pharmacological treatment, demonstrating behavior-modification techniques, and writing a letter to the client. Follow-up calls to earlier cases may be made.

VTMED 6610 Herd Health and Biosecurity Risk Evaluation Using the NYS Cattle Health Assurance Program (NYSCHAP) Model

Summer, fall. 2 credits. Minimum enrollment 5. Prerequisites: VTMED 5400; second-, third-, and fourth-year veterinary students or permission of instructor. Letter grades only. D. V. Nydam, K. Kaufman, F. L. Welcome, and Diagnostic Lab faculty.

Introduces students to the identification of disease risk and the evaluation of cattle operations, focusing on animal health, food safety, and the environment. The course combines information on risk assessment, creation of herd plans, biosecurity, Johne's disease, standard operating procedures, global trade, and environmental issues. Additionally, two local farms are visited to give students the opportunity to implement knowledge gained in lectures.

VTMED 6611 Small-Animal Orthopedic Surgery Service

Fall, winter, spring, and summer. 2 credits. Letter grades only. R. Todhunter and small-animal surgery faculty.

Clinical service rotation that exposes the student to the practice of surgery under hospital conditions. Students participate in office hours; diagnostic techniques; planning of therapy; and daily care of dogs and cats under the direction of interns, surgical residents in training, and faculty. Students assist experienced surgeons in the operating room. Client communications and the basics of efficient practice are emphasized. Students are expected to be able to successfully perform an orthopedic examination and localize the lameness by the end of the rotation. Shelter dogs and cats will be neutered by the students on the service as time permits.

VTMED 6612 Large-Animal Orthopedic/Sport Medicine Surgery Service

Fall, winter, spring, and summer. 2 credits. Letter grades only. N. Ducharme, A. Nixon, L. Fortier, and staff.

Clinical rotation structured to provide supervised clinical experience in the practice of large-animal surgery. Under the direction of faculty and house staff, students participate in the diagnosis, surgical treatment, and care of patients presented to the Equine and Farm Animal Hospital. Training through patient care is supplemented by formal rounds and didactic instruction.

VTMED 6613 Equine Specialty Rotation

Fall. 2 credits. Minimum enrollment 5; maximum 10. Prerequisite: VTMED 5510. Priority given to fourth-year veterinary students in equine pathway. Letter grades only. Live animals used for learning. G. Perkins and R. Hackett.

The objective of the rotation is to teach students basic diagnostic recognition and clinical skills for those interested in equine practice. These skills prepare students to respond on equine-related calls on their first day of work. The Cornell horse population is used to teach these practical skills. The emphasis of this elective is hands-on with discussion, rounds, and lectures. The rotation includes lectures and corresponding discussion groups to cover the scientific basis, controversies, industry-specific state of the art and clinical indications, contraindications, and potential complications of the various modalities.

VTMED 6614 Large-Animal Clinical Emergency and Critical Care

Summer and spring. 2 credits. Prerequisite: third- and fourth-year veterinary students. Letter grades only. R. Radcliffe and staff.

The evaluation and management of critical patients and other emergency problems represents a significant component of the practice of large-animal veterinary medicine. As emergency cases are frequently presented to these practitioners, it is imperative such veterinarians are well prepared. The focus of this clinical rotation is for students to acquire the knowledge, skills, and thought processes necessary to triage large-animal emergencies and manage critical patients. These skills include the appropriate evaluation, stabilization, and treatment of emergency patients and the management of post-operative cases and other critical patients. Participants access relevant information from various sources related to emergency and critical-care medicine and surgery in an effort to understand and apply these principles to clinical cases. Participants primarily have patient care responsibilities in the Large-Animal Intensive Care Unit of the Cornell University Hospital for Animals and work closely with technicians and clinicians to develop familiarity with technical and nursing procedures. In addition, students will learn common veterinary skills and techniques using teaching animals when time permits. The large-animal emergency and critical-care rotation is primarily an after-hours rotation.

VTMED 6615 Special Topics in Ambulatory and Production-Animal Medicine

Fall, winter, spring, and summer. 1–2 credits, variable. Prerequisite: second-, third-, and fourth-year veterinary students; VTMED 5600 and permission of instructor. Letter grades only. M. E. White and staff.

Provides specialized experiences in the Ambulatory and Production Medicine Service. Consists of participation in scheduled and emergency farm calls and completion of projects designed to provide experience in herd problem-solving, records analysis, and implementing herd-health programs. Clinical service assignments are planned to meet individual student goals. Examples of focus areas available include livestock production medicine, dairy reproductive examinations, and small-ruminant medicine.

VTMED 6616 Veterinary Dentistry Service

Fall, winter, spring, summer. 2 credits. Prerequisite: third- and fourth-year veterinary students who have completed Foundation Course V. Letter grades only. J. Rawlinson.

This rotation is designed to introduce students to clinical veterinary dentistry with an emphasis on small animals. The goal of this rotation is for students to become proficient in completing thorough oral examinations, identifying oral pathology, interpreting dental radiographs, discussing appropriate dental therapeutic options, and performing dental prophylaxis, basic periodontal procedures, and basic and advanced extractions.

VTMED 6617 South American Camelid Specialty Rotation

First 2 weeks in June. 2 credits. Minimum enrollment 6; Maximum enrollment 10. Prerequisite: completion of second year of Vet curriculum and VTMED 6530. Letter grades only. S. Bedford-Guaus, S. Purdy, G. Perkins, N. Ducharme, S. Fubini, M. Martin-Flores, L. Mizer, J. Wakshlag, E. Dubovi, and E. Ledbetter.

The objective of the rotation is to provide students with the necessary skills to be able to attend a routine camelid medical problem upon graduation. During the first week, students will work with the alpaca herd at the University of Massachusetts, Amherst, learning basic clinical skills and common health problems under the supervision of Dr. Purdy. During the second week, clinicians at Cornell University will provide specialty lectures and laboratories covering advanced medical problems and clinical techniques that will build upon the skills learned during the first week. The rotation will also include farm visits to familiarize students with different management systems and some of the clinical laboratories will be performed during these visits.

VTMED 6620 Introduction to Ambulatory Primary Care Medicine

Spring, summer, fall. 1 credit. Prerequisite: first-, second-, and first-semester third-year veterinary students. Letter grades only. M. White.

This a clinical service rotation in which students accompany ambulatory clinicians on farm and stable calls and learn the skills and procedures necessary for operation of a modern veterinary practice offering primary care and production medicine services to large-animal clients. Routine herd health visits are conducted for cattle, horses, sheep, goats, and swine. Reproductive evaluations (including pregnancy and fertility examinations), sick and lame animal evaluation and treatment, and other health maintenance procedures make up the majority of nonemergency work. Emergencies are usually obstetric cases, injuries, and acute illness. In addition to assisting with routine scheduled work, students participate in diagnosis and medical or surgical treatment of ill or injured animals. This includes rotating assignments for night and weekend duty.

VTMED 6621 Introduction to Small-Animal Clinical Orthopedics

Fall and spring. 2 credits. Prerequisites: UVIS training; ability to perform physical examination through Block V/IIA laboratory; permission of instructor. No expertise necessary in orthopedics. Letter grades only.

This distribution will allow students early in curriculum early exposure to small-animal clinical orthopedic practice. Students will shadow the senior students for the first week until they and the supervising faculty are sure they can function more independently. Students will perform activities expected of a senior DVM student whose primary responsibility is patient care, through which they learn how to prevent, diagnose, and treat clinical orthopedic disease. History taking, physical and orthopedic exam, radiography, laboratory testing, diagnosis, and options for treatment will be learned. Students will participate in rounds, scrub into surgery, administer post-operative care, learn the SOAP format for patient management; discuss patient

care with owners; become facile with electronic UVIS records; write discharge instructions and review them with owners and discharge patients.

VTMED 6622 Small-Animal Emergency Clinical Experience

Summer (Fall). 2 credits. Prerequisites: completion of first year of veterinary school; permission of instructor. Letter grades only.

Management of both emergent and critical cases represents a significant component of the practice of veterinary medicine. The focus of this course will be the initial development of a knowledge base and skill set necessary for a veterinarian to perform adequately in these areas, within a structured format. These skills will include the appropriate evaluation (triage) and stabilization of emergency patients, the management of postoperative and other critical patients, and sensitive and effective client communication. Participants will work closely with fourth-year students, interns, residents, technicians, and faculty on the Emergency and Critical Care Service to become familiar with technical and nursing procedures as well as to develop clinical skills and a systematic approach to clinical cases.

VTMED 6630 Student Rounds in Radiology

Fall and spring. 0.5 credit. Does not count toward elective rotation credits. Prerequisite: permission of instructor. P. Scrivani, M. Thompson, and N. Dykes.

Radiology rounds are a gathering of veterinarians and veterinary students to discuss the condition and imaging diagnosis of patients in the hospital. These are student-presented rounds and all students are expected to attend. Presentations emphasize the selection of the appropriate imaging examination, detection of imaging signs, diagnostic or prognostic importance of imaging signs, and the impact of the imaging examination on subsequent patient care.

VTMED 6631 Diagnosis and Treatment of Diseases of the Dairy Cow—A Case-Based Approach Utilizing Hospitalized Cases

Fall, winter, spring, summer. 0.5–1 credit; 0.5 credit requires participation in seven sessions; 1 credit requires participation in 14 sessions during the semester; students may change credits up through seventh week of class; course may be taken up to three semesters. Maximum enrollment 14. Students selected after submission of résumé, letter of intent, and documentation of career focus on dairy cattle. Prerequisite: completion of first-year vet curriculum and permission of instructor. S–U grades only. T. Divers and S. Fubini.

This course is designed for dairy-focused veterinary students and will expose them to diagnosis and management of diseases of dairy cattle, focusing on individual animal medicine and surgery rather than production. According to and utilizing existing hospital cases, students will meet with clinicians during the academic year to examine and discuss cases. Case logs, literature review, attendance, and class presentations will be required.

VTMED 6720 The Literature and Subject Matter of Natural History

Spring. 1 credit. Minimum enrollment 10; maximum 30. Prerequisite: third- and fourth-year veterinary students. S–U grades only. H. E. Evans.

Introduces natural history literature. Shows and discusses materials relating to the earth sciences and the biology of plants and animals from around the world. Students are required to show and discuss a book that concerns natural history in a country of their choice and submit a one-page book report for duplication. (A recommended reference text is *The Cambridge Illustrated Dictionary of Natural History* by R. J. Lincoln and G. A. Boxshall, 1990.) Golden Guides for mammals, birds, reptiles, fishes, insects, pond life, seashore life, and tropical fish may be given to participants.

VTMED 6721 Introduction to Avian Biomedicine

Spring. 1.5 credits. Minimum enrollment 10; maximum 60. Prerequisite: first-, second-, third-, and fourth-year veterinary students or permission of instructor. Letter grades only. G. V. Kollias, A. J. Bezuidenhout, and D. Muscarella.

Introduction to avian biology for veterinary students. Includes lectures and laboratories involving avian anatomy, physiology, and natural history. The course emphasizes the development of a strong foundation in avian biology that is applied in VTMED 6522 Diseases of Birds and VTMED 6532 Avian Medicine and Surgery.

VTMED 6722 AQUAVET I: Introduction to Aquatic Veterinary Medicine

Four weeks of full-time instruction at Woods Hole, Mass., immediately after spring semester. 4 credits. Maximum enrollment 24 students from Cornell U., the U. of Pennsylvania, and other U.S. colleges and schools of veterinary medicine. Available, by competitive application process, to veterinary and graduate students. S–U grades only. Fee charged. P. R. Bowser.

Sponsored by Cornell U., the U. of Pennsylvania, and three marine-science institutions at Woods Hole: the Marine Biological Laboratory, Woods Hole Oceanographic Institution, and Northeast Center of the National Marine Fisheries Service. Introduces veterinary students to aquatic-animal medicine. The marine environment is described and visited on field trips in the Woods Hole area. Specific aspects of the comparative anatomy, physiology, nutrition, microbiology, pathology, and medicine of a variety of marine and freshwater species are discussed. Some emphasis is placed on systems of aquaculture. The specific diseases of a few selected species are presented as examples. The course is taught by an invited faculty of 35 individuals who are leaders in their respective fields of aquatic-animal medicine. Students present seminars on appropriate topics.

VTMED 6723 Veterinary Medicine in Developing Nations

Spring. 2 credits. Prerequisite: first-, second-, third-, and fourth-year veterinary students or permission of instructor. S–U grades only. Offered even-numbered years. K. A. Schat.

Veterinary medicine has an important role to play in developing nations in developing and providing economical sources of animal protein for human consumption and protecting ecological resources. This seminar course provides interested veterinary students with information on and insight into the multitude of complex issues facing U.S. veterinarians working in developing nations.

VTMED 6724 Senior Seminar

Fall and spring. 0.5 credit. Does *not* fulfill 1-credit Set VII minimum. Prerequisite: first-, second-, and third-year veterinary students. S–U grades only. M. Smith. Attendance at 10 of the senior seminar sessions presented during the academic year constitutes acceptable completion of this course. If not completed during semester enrolled, an incomplete grade will be assigned and the remaining sessions must be completed during the following semester or a failing grade will be assigned.

VTMED 6726 Introduction to the Professional Literature

Spring. 1 credit. Minimum enrollment 6; maximum 20. Prerequisite: first-, second-, third-, and fourth-year veterinary students. S–U grades only. S. Whitaker. Introduces veterinary students to the professional and biomedical literature, including development of critical reading skills. Students become familiar with the broad range of professional and biomedical literature and are encouraged to develop a rigorous approach to journal and scientific article review. Secondary emphasis is on developing skills in library and bibliographic search techniques and strategies for personal information management, as well as exploring the use of veterinary-related online information.

VTMED 6727 Introduction to Community Practice Service

Fall, winter, spring, and summer. 1 credit. Prerequisite: first- and second-year veterinary students; permission of instructor. S–U or letter grades. W. E. Hornbuckle. Introduces veterinary students to primary care small-animal clinical practice through direct exposure to the Community Practice Service of the Cornell University Hospital for Animals. Students observe and assist with restraint, examination, and routine treatment of pets and communication with clients. Successful completion requires satisfactory participation during 10 half-days of clinical service.

VTMED 6728 Clinical Management of Native Wildlife

Fall, spring, summer (credit given in fall). 1 credit. Maximum enrollment 30 students per semester. Prerequisite: first-, second-, third-, and fourth-year veterinary students. Letter grades only. G. V. Kollias and staff. Introduces veterinary students to primary care for native wildlife and to wildlife issues that practicing veterinarians face on a daily basis. Students are responsible for the assessment, physical examination, and medical care of native wildlife presented to the Cornell University Wildlife Health Center by the public and local wildlife rehabilitators. Student activities are directly supervised and assessed by faculty and residents on a daily basis. Scheduling is organized by a designated student supervisor. Successful completion of the course requires 40 hours of satisfactory supervised participation per semester in the clinic. Clinic times are appropriately scheduled throughout the semester. Students are required to submit two case summaries, or alternatives approved by the course leader, before the end of the semester and a log of their clinical hours.

VTMED 6729 Introduction to Equine Practice

Spring. 0.5 credit. Maximum enrollment 50. Prerequisite: veterinary students. Intended for students with little or no experience working with horses. Letter grades only. R. Hackett and C. Collyer. Introductory course in equine husbandry. Lecture topics include horse breeds and colors, housing facilities and fencing, and overview discussions of the racing, showing, and breeding industries.

VTMED 6730 Behavior Problems of Horses

Spring. 1 credit. Prerequisite: one semester of veterinary curriculum; first-, second-, third-, and fourth-year veterinary students. S–U grades only. K. A. Houpt. The goal of this course is to give veterinary students the ability to treat the behavior problems of horses. History-taking, counseling, diagnostic tests, follow-up, the importance of cooperation with the referring veterinarian, prevention of behavior problems, training techniques of value to the practitioner, and socialization of foals are presented.

VTMED 6731 Behavior Problems of Small Animals

Spring. 1 credit. Minimum enrollment 10. Prerequisite: one semester of veterinary curriculum; first-, second-, third-, and fourth-year veterinary students. S–U grades only. K. A. Houpt. The goal of this course is to give veterinary students the ability to treat the behavior problems of cats and dogs. History-taking, counseling, and follow-up methods are presented. Each student has the opportunity to participate in three cases. Behavioral and pharmacological treatments for behavior problems are presented.

VTMED 6733 Veterinarians and Food-Animal Production Systems: An Introduction

Spring. 1 credit. Minimum enrollment 5. Prerequisite: first- and second-year veterinary students or permission of instructor. Letter grades only. D. V. Nydam and invited speakers.

This seminar course uses an interactive format and multiple experts from their fields to introduce future veterinarians to various food-animal production systems, how veterinarians interact with them, and the synergy between these systems and veterinarians in society. Each week the production structure of the dairy, beef, swine, poultry, or aquaculture industry, veterinarians' role in them, and career opportunities and expectations are discussed. The offering is intended for first- or second-year students so that they can plan appropriately to take additional courses or set up externships in the following years.

VTMED 6734 Companion Animal Welfare Issues

Spring. 1 credit. Minimum enrollment 3; maximum 50. Letter grades only. J. M. Scarlett, L. Appel, and L. Miller. Companion animal welfare issues have become a major concern for many American communities. Precipitated by the changing status of companion animals, the proliferation of free-roaming cats, and human safety issues, communities are considering (or have passed) breed-specific bans, restrictions on declawing, and solutions for "free-roaming" cats. This course will address these and other issues such as pet surplus—animals entering shelters

and those euthanized in shelters; the "no-kill" movement, reasons for relinquishment to shelters; recognition and documentation of animal abuse; the use of pediatric neutering in population control—studies relating to safety and potential adverse effects; dogs and cock fighting and the role of the veterinarian in the recognition and reporting of these activities. The objective of the course is to provide information for veterinary students such that they can assume leadership with regard to these issues in their future communities.

VTMED 6735 Conservation Medicine

Spring. 1.5 credits. Maximum enrollment 80. Prerequisite: veterinary students, graduate students at CVM, others by written permission of instructor. Letter grades only. G. V. Kollias, A. J. Travis, and N. Abou-Madi. Conservation Medicine will introduce students to the basic concepts of free-ranging and captive wildlife conservation and will engage veterinary students in issues of sustainable development relating to wildlife. The course will present information not included in other courses within the curriculum that is fundamental for veterinarians contemplating a career in conservation medicine, wildlife health, or zoological medicine. This course will complement existing courses in the curriculum including, but not limited to, Introduction to Avian Biomedicine, Avian Diseases, Veterinary Aspects of Captive Wildlife, Veterinary Medicine in Developing Nations, The Literature and Subject Matter of Natural History, Comparative Anatomy, Foreign Animal Diseases, Epidemiology of Infectious Diseases, Anatomy and Histology of Fishes, and Fish Health Management. Students will learn how wildlife populations are regulated by their environment and how such populations are managed and assessed. Various habitat preservation strategies will be presented and discussed. Conversely, for critical endangered species, the focus will be on *ex situ* recovery programs.

VTMED 6736 Pet Loss and Bereavement Counseling Course

Spring. 0.5 credit. S–U grades only. M. McEntee. This course introduces first- and second-year veterinary students to the key issues related to the loss of a companion animal and bereavement counseling. The course provides a structured background to assist students in developing the necessary skills to deal with clients and the grieving process. Students will participate in Cornell University's Pet Loss Support Hotline, a telephone-based community outreach program designed to provide support to callers grieving the loss of a companion animal. Students actively participate in the prerequisite nine hours of training in the fall semester, followed by hand-on experience staffing the Pet Loss Support Hotline, attendance in rounds (twice a semester), and will maintain a case log and write one case report.

UNDERGRADUATE AND GRADUATE COURSES

These courses are taught by the faculty in the College of Veterinary Medicine but do not contribute to the D.V.M. degree requirements.

Biomedical Sciences

VTBMS 3460 Introductory Animal Physiology (also BIOAP 3110) (Undergraduate)

Fall. 3 credits. Prerequisites: one year college biology, chemistry, and mathematics. S-U (letter grades by permission of instructor). E. R. Loew. For description, see BIOAP 3110.

VTBMS 4010 Genomic Analysis

Spring. 3 credits. Prerequisites: upper-level undergraduates and graduate students; BIOGD/VTBMS 4000 or equivalent by permission of instructor. Letter grades only. T. O'Brien.

Overview of approaches and tools used in genomic research. Covers experimental and computational technologies as well as theoretical concepts important for the study of genomes and their function. Topics include genome sequencing and assembly, high-throughput sequencing, comparative genomics, genetic variation and complex traits, expression profiling and proteomics, genome modification and transgenesis, modeling network structure, and dynamics. Discussions will explore how genomic tools and approaches can be integrated to study biological systems.

VTBMS 6000 Special Projects in Anatomy

Fall, spring. 1 credit per 2.5-hour period. Prerequisite: permission of instructor. S-U grades only. Biomedical science staff.

VTBMS 6100 Genomes as Chromosomes

Fall. 1 credit. Prerequisites: upper-level undergraduates and graduate students; others by permission of instructor or BIOGD 2810 and BIOBM 3320. Letter grades only. Offered alternate years. T. O'Brien and P. Cohen.

The eukaryotic genome is partitioned into discrete structural units, the chromosomes. This course examines how chromosome organization is related to chromatin structure, gene expression, DNA replication, repair, and stability. Special emphasis is placed on how the linear arrangement of sequence features along the chromosome, such as genes and regulatory modules, relate to the functional organization of the genome in the nucleus. Experimental and computational approaches used to address chromosome structure and function are studied.

VTBMS 6110 Genomes Maintenance Mechanisms

Fall, first half of semester. 1 credit. Minimum enrollment 7. Prerequisites: upper-level undergraduates and graduate students; BIOGD 2810, BIOBM 3300, or 3330, or 3310/3320 or equivalents. S-U or letter grades. R. Weiss.

Focuses on the molecular mechanisms used by eukaryotic cells to preserve genomic integrity. Topics include endogenous and exogenous sources of mutation, DNA repair pathways, and cell cycle checkpoint mechanisms. Also addresses how genome maintenance impacts genome plasticity and evolution, as well as the relationship between genomic instability and disease, including cancer.

VTBMS 6120 Overview of Model Genetic Organisms

Spring. 1 credit. Minimum enrollment 5; maximum enrollment 20. Prerequisites: upper-level undergraduates and graduate students; BIOGD 2810 or BIOGD/VTBMS 4000 or permission of instructor. S-U or letter grades. Offered alternate years. J. Schimenti and guest lecturers.

Presents the features of various model organisms and their relative merits for conducting various types of genomics/genetics research. Model systems discussed are: *Arabidopsis*, yeast, *Drosophila*, *C. elegans*, zebrafish, and mice.

VTBMS 6200 Research Fellowship in Biomedical Sciences

Fall, spring. 1-12 credits. Cannot be used to fulfill formal course requirements for DVM curriculum. Prerequisite: permission of instructor. S-U grades only. Offered by individual faculty members in the Department of Biomedical Sciences for DVM students undertaking research in research fellowship.

VTBMS 7010 Mouse Pathology and Transgenesis (also TOX 7010)

Fall, meets during second half of semester and relies on background information from NS BIOGD 4900, which meets during first half. Students interested in both courses must register for them separately. 1 credit. Maximum enrollment 12 students. Prerequisite: permission of instructor. Highly recommended: basic histology course (BIOAP 4130) and BIOGD 4900. Letter grades only. A. Nikitin and staff.

Introductory course on contemporary mouse pathobiology explains principles and methods of pathology. The course focuses on systematic evaluation of new genetically modified mice, with particular attention to such topics as experimental design, validation of mouse models, and identification of novel phenotypes. Also included is supervised mouse necropsy.

VTBMS 7020 The Practice of Laboratory Animal Medicine

Fall, spring. 1 credit. Prerequisite: upper-level undergraduate or graduate standing; basic knowledge of anatomy and pathology in comparative animal species. S-U or letter grades. M. E. Martin.

Laboratory animal veterinarians must be trained in the regulatory aspects of research and teaching utilizing animals; in addition, they must understand the principles of facility management and design. Also, to work with researchers, lab animal veterinarians must have knowledge of basic research methodologies and animal welfare issues. This course may also be of interest to other veterinarians, veterinary students, and researchers who wish to understand the workings of the specialized field that oversees and enables the use of animals in research and teaching. The topics covered include: Laboratory Animal Medicine: Historical Perspectives; Laws, Regulations, and Policies; Design and Management of Animal Facilities; Anesthesia, Analgesia, and Euthanasia; Techniques of Experimentation; Control of Biohazards Used in Animal Research; Selected Zoonoses/Xenozoonoses; Genetic Monitoring; Transgenic and Knock-out Mice; Factors Influencing Animal Research; Animal Models in Biomedical Research; Research in Lab Animal and Comparative Medicine; Lab Animal Behavior.

VTBMS 7030 The Biology and Diseases of Laboratory Animals

Fall, spring. 2 credits. Prerequisite: upper-level undergraduate or graduate standing; basic knowledge of anatomy and pathology in comparative animal species. S-U or letter grades. M. E. Martin.

Intended for veterinarians entering the field of laboratory animal medicine. It may also be of interest to other veterinarians, veterinary students, and researchers with a basic knowledge of anatomy and pathology who use animals in research or teaching. This course will cover the main laboratory animal species (rodents, rabbits, nonhuman primates, ruminants, swine, dogs, cats, ferrets, reptiles, amphibians, and fish). The biology, husbandry, diseases, pathology, and main research uses of these species will be covered. The course will meet for two hours weekly and will extend over the course of two years.

VTBMS 7130 Cell Cycle Analysis

Spring. 1 credit. Minimum enrollment 5 students. S-U grades only. Offered even-numbered years. A. Yen.

Presents a brief historical review of the cell cycle; a summary of cell-cycle regulatory processes; and practical methods for cell-cycle analysis, including mathematical representations. Topics include growth control of bacterial cell cycle including chemostats, mammalian-cell tissue culture, cell synchronization, flow cytometry, age-density representation, G1 regulation, labile regulatory protein models, cell transformation, regulation by growth factors and the cytoskeleton, cyclin/E2F/RB regulatory model, practical examples for analysis of cell-cycle phase durations, cell-cycle phase specific growth factor sensitivity, and timing of RB protein phosphorylation within the cell cycle. The objective of the course is to present graduate students with methods for cell-cycle analyses that will be used in their research.

VTBMS 7200 Animal Physiology and Anatomy Seminar

Fall, spring. 1 credit. Prerequisite: admission to graduate field of physiology; permission of instructor. S-U or letter grades.

Designed to train graduate students in the field of physiology to become professional scientists. Students are required to give a seminar on their research. Advice and feedback are provided. Throughout the semester, advice is provided on subjects such as preparation of manuscripts, seminars, and grant proposals.

VTBMS 7880 Seminar in Surgical Pathology

Fall, spring. 1 credit. Intended for residents in anatomic pathology; third- and fourth-year veterinary students may attend. Letter grades only. D. H. Schlafer and faculty of the Section of Anatomic Pathology and visiting pathologists.

The major objective of this discussion and seminar course is to introduce the residents to the discipline of surgical pathology. Selected material from the Surgical Pathology Service is prepared in advance for independent review by the residents. The material is presented in a slide-seminar format by the residents under the review of the faculty. Emphasis is placed on pathogenesis, etiology, and pathologic descriptions of the lesions. In addition, appropriate guest lecturers cover specific areas of interest and special topics not encountered in the departmental service programs.

Clinical Sciences

VETCS 6180 Principles of Medical Imaging (also BME 6180)

Fall. 3 credits. Prerequisite: graduate D.V.M.s or equivalent in residency or graduate training programs. Letter grades only. Y. Wang and N. Dykes.

For description, see BME 6180.

VETCS 7000 Pathophysiology of Gastrointestinal Surgery

Fall. 1 credit. S-U grades only. Offered every third year. S. L. Fubini.

Initially presents normal anatomy and physiology of the gastrointestinal system in carnivores, herbivores, and ruminants. This is followed by in-depth discussion of the pathophysiological mechanisms and sequelae of gastrointestinal obstructions including reperfusion injury, peritonitis, adhesions, and short bowel syndrome. This course emphasizes development of an advanced understanding of surgically relevant gastrointestinal problems leading to appropriate decision-making.

VETCS 7010 Pathophysiology of Orthopedic Surgery (Graduate)

Spring. 1.5 credits. Prerequisites: D.V.M., M.D., or equivalents or permission of instructor. S-U grades only. Offered every third year. A. J. Nixon.

Provides specialized training in the anatomic, physiologic, and pathologic process of musculoskeletal diseases in animals and humans, with special emphasis on surgical diseases of tendons, bones, and joints.

VETCS 7020 Pathophysiology of Respiratory and Cardiac Surgery (Graduate)

Fall. 1.5 credits. Prerequisite: D.V.M. or equivalent. S-U grades only. Offered every third year. R. P. Hackett, S. L. Fubini, and N. G. Ducharme.

Using lectures and group discussions, the objective of this course is to explain the pathophysiology of various cardiovascular diseases (cardiac arrest, cardiac arrhythmia under anesthesia) and airway disease (thoracic and upper-airway disease). As a basis for these abnormalities, cardiopulmonary hemodynamics and biomechanical aspects of ventilation are reviewed. The emphasis is placed on understanding these mechanisms and outlining the surgeon's response to them.

VETCS 7030 Surgical Principles and Surgery of the Integumentary System (Graduate)

Spring. 1 credit. Prerequisite: graduate D.V.M.s or equivalent in residency or graduate training programs. S-U grades only. Offered every third year. S. L. Fubini.

Designed for surgery residents and graduate students. It is largely discussion format and examines surgical principles and surgery of the integumentary system.

VETCS 7040 Pathophysiology of Urogenital Surgery (Graduate)

Fall. 1 credit. Prerequisite: graduate D.V.M.s or equivalent in residency or graduate training programs. S-U grades only. Offered every third year. R. P. Hackett.

Designed to review and discuss urogenital surgical procedures in animals and the rational basis for them. Pathophysiology is stressed. Some classes consist of reprints with discussion.

VETCS 7060 Pathophysiology of Neurologic Surgery (Graduate)

Spring. 1.5 credits. Prerequisite: D.V.M.s, M.D.s, or equivalent or permission of instructor. S-U grades only. Offered every third year. A. J. Nixon.

Provides specialized training in neurosurgical techniques and application and discusses pathophysiological implications of neurosurgical and neurologic diseases.

VETCS 7100 Advanced Veterinary Anesthesiology I

Fall. 1 credit. Prerequisite: VTMED 5606 or permission of instructor; third- and fourth-year veterinary students, graduate students, interns, and residents. S-U grades only.

A. L. Campoy, M. Flores, R. D. Gleed, W. A. Horne, A. L. Looney, and J. W. Ludders.

Designed to prepare students for the American College of Veterinary Anesthesiology examinations. Also suitable for interns and for residency training in other areas such as surgery and internal medicine. Speakers are from both inside and outside the college.

Topics cover the basic sciences as they apply to anesthesiology such as physics and engineering, applied pharmacology, physiology, and pathology. Clinically oriented lectures are also given concerning specific anesthetic techniques and species-specific differences in response to anesthetic drugs.

VETCS 7110 Advanced Veterinary Anesthesiology II

Spring. 1 credit. Prerequisite: VTMED 5606 or permission of instructor; third- and fourth-year veterinary students, graduate students, interns, and residents. S-U grades only. A. L. Campoy, M. Flores, R. D. Gleed, W. A. Horne, A. L. Looney, and J. W. Ludders.

Designed to prepare students for the American College of Veterinary Anesthesiology examinations. Also suitable for interns and for residency training in other areas such as surgery and internal medicine. Speakers are from both inside and outside the college.

Topics cover the basic sciences as they apply to anesthesiology such as physics and engineering, applied pharmacology, physiology, and pathology. Clinically oriented lectures are also given concerning specific anesthetic techniques and species-specific differences in response to anesthetic drugs.

Microbiology and Immunology

VETMI 2990 Research Opportunities in Microbiology and Immunology

Summer, six-week session. 6 credits; minimum 120 hours lab time expected per 3 credits. Prerequisites: one year of basic biology (scores of 5 on Biology Advanced Placement Examination of College Entrance Examination Board or BIOG 1000 level). Letter grades only. Microbiology and Immunology faculty.

Mentored research apprenticeship program designed to give laboratory experience to qualified unmatriculated high school students (participating in Cornell Summer College).

VETMI 6050 Special Projects in Microbiology (Undergraduate)

Fall, spring. 1-3 credits. Prerequisite: permission of instructor; good background in microbiology or immunology. Recommended: background in pathogenic microbiology and immunology. S-U grades only. Microbiology staff.

Normally provides an opportunity for the student to work in a research laboratory or carry out a special project under supervision.

VETMI 6200 Research Fellowship in Microbiology and Immunology

Fall, spring. 1-12 credits. Cannot be used to fulfill formal course requirements for DVM curriculum. Prerequisite: permission of instructor. S-U grades only. Faculty TBA.

Offered by individual faculty members in the Department of Microbiology and Immunology for DVM students undertaking research in Research Fellowship.

VETMI 7000 The Biology of Animal and Plant Viruses (Graduate and Upper-level Undergraduate)

Fall. 2 credits. Letter grades only. Offered odd-numbered years. C. R. Parrish and virology faculty.

Examines current topics in studies of animal and plant viruses. Topics examined in depth include the structures of viruses and their interactions with host cells.

VETMI 7050 Advanced Immunology

Spring. 3 credits. Prerequisite: basic immunology course or permission of instructor. Letter grades only. Offered even-numbered years. C. Leifer and staff.

This course covers selected topics in immunology at an advanced and in-depth level through lectures and paper discussions. Topics include genomic approaches to immunology, host defense by macrophages and neutrophils, pattern recognition receptors, molecular signaling events, regulation of immune responses, T helper cell differentiation, immunologic memory, neonatal immunity, mucosal immunology, and vaccines. There will be two in-class exams in addition to the final exam.

VETMI 7070 Advanced Work in Bacteriology, Virology, and Immunology (Graduate)

Fall, spring. 1-3 credits. Prerequisite: permission of instructor. S-U or letter grades. Microbiology staff.

Designed primarily for graduate students with a good background in pathogenic microbiology and immunology. May be elected by veterinary students who are properly prepared.

VETMI 7120 Seminars in Infection and Immunity

Fall, spring. 1 credit. Requirement for graduate students in Department of Microbiology and Immunology and field of immunology. S-U grades only. D. G. Russell.

Invited speakers in immunology and infection biology acquaint students with current advances in the field. For seminar schedule and speaker list, see the web site at www.vet.cornell.edu/public/InfectionAndPathobiology/seminar_fall.htm and www.vet.cornell.edu/public/InfectionAndPathobiology/seminar_spring.htm.

VETMI 7130 Biological and Biomedical Sciences Program—Teaching Experience

Fall, spring. 1 credit. Requirement for first-year graduate students. S-U grades only. D. G. Russell.

All graduate students who are a part of the Biological and Biomedical Sciences Program must complete this 1-credit teaching experience. The goal is for each graduate student to increase his or her knowledge in a

biology area and simultaneously increase confidence in his or her teaching abilities. Specific teaching assignments are administered through the CVM's Office of Graduate Education. A faculty mentor provides ongoing feedback throughout the experience.

VETMI 7190 Immunology of Infectious Diseases

Spring, 2 credits. Prerequisite: basic immunology course or permission of instructor. S-U or letter grades. Offered odd-numbered years. M. Bynoe and staff. Focuses on molecular and cellular mechanisms underlying the immunity and innate recognition of viruses, bacteria, and protozoa pathogens.

VETMI 7230 Current Topics in Immunology

Fall, spring, 1 credit. Registration each semester required of field of immunology graduate students. Prerequisite: graduate standing. S-U grades only. Immunology faculty.

Immunology discussion group in which students present research papers from the contemporary scientific literature.

VETMI 7250 Mechanisms of Microbial Pathogenesis (also BIOMI 7250)

Spring, 3 credits. Prerequisites: BIOMI 4040, 4090, 4170 or equivalent course; written permission of instructor for undergraduates. Letter grades only. D. Debbie, H. Marquis, and M. Scidmore. Covers the mechanisms of pathogenesis of bacteria, fungi, parasites, and viruses. Addresses the need for a course covering the breadth of microbial pathogenesis. Emphasizes, at the molecular and cellular levels, the methods microbial pathogens use to enter, survive, and cause damage to their hosts. By studying the molecular mechanisms of all the major microbial groups together, students will be able to appreciate the commonality of pathogenic mechanisms as well as see the unique properties of each group of organisms. The contribution of the host response to the pathogenesis process will be covered, but in less detail as this information is addressed in VETMI 7190 Immunology of Infectious Diseases.

VETMI 7370 Advanced Work in Animal Parasitology (Graduate)

Fall, spring, 1-3 credits. Prerequisite: advanced undergraduate, graduate, and veterinary students. Letter grades only. D. D. Bowman and other faculty. Intended for advanced undergraduate, graduate, and veterinary students with interests in parasitology research.

VETMI 7700 Advanced Work in Avian Diseases (Graduate)

Fall, spring, 1-3 credits. Letter grades only. K. A. Schat.

VETMI 7720 Advanced Work in Aquatic Animal Diseases (Graduate)

Fall, spring, 1-3 credits. S-U grades only. P. R. Bowser.

VETMI 7730 Advanced Work in Avian Immunology

Fall, spring, Variable credit. Letter grades only. K. A. Schat.

VETMI 7830 Seminars in Parasitology (Graduate)

Fall, spring, 1 credit. Prerequisite: veterinary or graduate students or permission of instructor. S-U grades only. D. D. Bowman.

Seminar series designed to acquaint students with current research in the field of parasitology. The range of topics is determined, in part, by the interests of those participating and may include such topics as the ecology of parasitism, parasite systematics, wildlife parasitology, and parasitic diseases of plants and animals, including humans.

Molecular Medicine

VETMM 2990 Undergraduate Research in Pharmacology

Summer, six-week session. 3 to 6 credits; minimum 120 hours of lab time expected per 3 credits. Prerequisites: one year basic biology (score of 5 on Biology Advanced Placement Examination of College Entrance Examination Board or BIOG 1000 level.) Letter grades only. R. A. Cerione.

Mentored research apprenticeship program designed to give laboratory experience to qualified un-matriculated high school students (participating in Cornell Summer College) or Cornell underclassmen. Students are placed in a research laboratory with a designated project under the direct supervision of a research associate (upper-level graduate student, post-doc, or faculty member). Students are graded on preparation, participation in laboratory academic life, and appropriate acquisition of techniques. At the end of the session, students are expected to give a brief (15- to 20-minute) oral presentation of their work and submit a manuscript in a form suitable for publication. The faculty director has ultimate responsibility for evaluating the student's work and assigning the grade.

VETMM 4700 Biophysical Methods (also AEP/BIONB 4700)

Fall, 3 credits. Prerequisite: permission of instructor; basic knowledge of physics and mathematics. Recommended: some knowledge of physical chemistry, molecular and cell biology, or neurobiology. Letter grades only. M. Lindau.

For description, see AEP 4700.

VETMM 5710 Biophysics Methods Advanced Laboratory (also AEP 5710)

Spring, taught daily during first three weeks of Jan. 3 credits. Prerequisites: VETMM 4700. S-U or letter grades. M. Lindau.

For description, see AEP 5710.

VETMM 6100 Cellular and Molecular Pharmacology

Fall, 2 credits. Prerequisite: permission of instructor. S-U or letter grades. Offered even-numbered years. C. M. S. Fewtrell and field of pharmacology faculty.

Graduate-level course surveying the molecular and cellular aspects of receptor mechanisms, signaling pathways, and effector systems. Topics include drug-receptor interactions; ligand- and voltage-gated ion channels; G protein pathways; growth factor signaling; calcium; nutrient and nitric oxide signaling; mechanisms of receptor-mediated effects on neural excitability, electrical pacemakers, muscle contraction, gene expression; and chemotherapy, including antimicrobial agents and cancer chemotherapy.

VETMM 6110 Systems Pharmacology

Spring, 2 credits. Prerequisite: permission of instructor. S-U or letter grades. Offered even-numbered years. C. M. S. Fewtrell and field of pharmacology faculty. Graduate-level course surveying system- and organ-related aspects of pharmacology. Topics include drug disposition; pharmacokinetics; autonomic pharmacology; central nervous system pharmacology; pharmacology of inflammation, allergy and platelet function; and cardiovascular, gastrointestinal, and endocrine pharmacology.

VETMM 6120 Topics in Pharmacology

Fall (even sections), spring (odd sections), taught once a week for 10 weeks during the semester. 0.5 credit. Prerequisite: none. S-U grades only. L. M. Nowak (even sections); H. Sonderman (odd sections). A journal club-workshop course based on topics corresponding to the Department of Molecular Medicine seminar series. In the journal club, students will select and present papers with guidance from the course director. Career development topics will be intended to promote students reading widely in the scientific literature and to develop their public speaking skills.

VETMM 6130 Medical Pharmacology

Spring, taught from third week of March through first week of May. 2 credits. Prerequisite: permission of instructor. Letter grades only. Offered odd-numbered years. A lecture course covering basic principles of pharmacology and physiology, will feature the central and peripheral nervous system and muscle, cardiovascular, renal pulmonary systems, and gastrointestinal tract. This course is intended to provide graduate students with a strong foundation in medical pharmacology required for teaching in a medical curriculum. Grades will be based on take-home midterm and final exams.

VETMM 7010 Organ-System Toxicology (also TOX 6110)

Fall, 1 credit. Prerequisite: graduate students in environmental toxicology. S-U grades only. Offered even-numbered years. W. S. Schwark. Minicourse on molecular mechanisms involved in chemical toxicity. Considers specific examples of toxicity in organ systems such as the nervous system, kidney, liver, respiratory tract, and cardiovascular system.

[VETMM 7030 Receptor-Ligand Interactions

Fall, 2 credits. Prerequisite: permission of instructors. S-U or letter grades. Offered even-numbered years; next offered 2010-2011. G. A. Weiland and R. E. Oswald. Covers both the practical and theoretical tools for the study of ligand-receptor interactions, emphasizing the quantitative and physical chemical aspects of receptor theory. Topics discussed are basic methods of radioligand binding assays, including separation and measurement of bound and free ligand; characterization of receptor function; analysis of receptor structure; thermodynamic basis of the binding; methods of analyzing equilibrium binding; equilibrium binding for complex binding mechanisms; and kinetics of simple and complex binding mechanisms.]

VETMM 7040 CNS Synaptic Transmission

Fall. 2 credits. Limited to 20 students. Prerequisite: graduate students, undergraduate seniors, or juniors majoring in neurobiology; permission of instructor. S-U or letter grades. Offered even-numbered years. L. M. Nowak.

Survey course in vertebrate central nervous system physiology and pharmacology that focuses on mechanisms of neuro-transmitter action at the membrane and cellular levels. Roles of selected neurotransmitters in normal brain and neurological disorders are discussed. Topics are introduced in lectures and followed up by discussions of recent journal articles.

VETMM 7050 The Chemistry and Biology Behind Cell Signaling

Spring. 2 credits. S-U or letter grades. Offered even-numbered years. R. A. Cerione.

Focuses on the mechanisms of action of GTP binding proteins. Examines several receptor-coupled signaling systems, including adenylyl cyclase, vertebrate vision, phosphatidylinositol lipid turnover, receptor systems regulating various ion channels, and receptors involved in cell growth regulation.

[VETMM 7060 Growth Factor-Coupled Signaling (also BIOBM 7340)]

Fall. 0.5 credit. Prerequisite: permission of instructor. S-U or letter grades. Offered even-numbered years; next offered 2010-2011. R. A. Cerione.

The general theme of this course is mitogenic signaling pathways. Receptor tyrosine kinases, src, ras, and ras-regulatory proteins are covered.]

VETMM 7070 Protein NMR Spectroscopy (also BIOBM 7300)

Spring. 2 credits. Prerequisites: CHEM 3890 and 3900 or 2870 and 2880 or permission of instructor. S-U or letter grades. Offered even-numbered years. R. E. Oswald and K. L. Nicholson.

The student acquires the tools necessary for in-depth understanding of multidimensional, multinuclear NMR experiments. Schemes for magnetization transfer, selective excitation, water suppression, decoupling, and others are presented. The application of these techniques to proteins for resonance assignments, structure determination, and dynamics characterization is studied.

VETMM 7100 Biological and Biomedical Graduate Program—Teaching Experience

Fall and spring. 1 credit. Requirement for first-year graduate students. S-U grades only. G. A. Weiland.

All graduate students who are a part of the Biological and Biomedical Sciences Graduate Program must complete a teaching experience. The goal of the experience is for each graduate student to increase his or her knowledge in a biology area and simultaneously increase skills and confidence in his or her teaching abilities. Specific teaching assignments will be administered through the CVM Office of Graduate Education. A faculty mentor will provide ongoing feedback.

VETMM 7200 Patch Clamp Techniques in Biology

Spring, taught daily during second and third weeks of Jan. 2 credits. S-U grades only. Offered even-numbered years. Times TBA. L. M. Nowak.

Students learn theoretical background for patch clamp studies in morning lectures. The experimental techniques of conventional and permeabilized patch whole-cell recording and single channel recordings in cell-attached and excised membrane patches are taught in 15 hours of afternoon laboratory instruction per student. Lab training sessions are arranged individually throughout the spring semester.

VETMM 7300 Graduate Research in Pharmacology or Molecular Medicine

Fall, spring, and summer. 1-12 credits. May not be used to fulfill formal course requirements for field of pharmacology. Prerequisite: permission of instructor. S-U grades only.

Offered by individual faculty members in the Department of Molecular Medicine and the graduate field of pharmacology for graduate students undertaking research toward M.S. or Ph.D. degrees.

VETMM 7400 Special Projects and Research in Pharmacology

Fall, spring, and summer. 1-3 credits each topic. May not be used to fulfill formal course requirements for field of pharmacology. S-U or letter grades. Field of pharmacology faculty.

Enables students to undertake research in an area related to the research interests of a faculty member in the graduate field of pharmacology. Topics include but are not limited to Mechanisms of Growth-Factor Action—R. A. Cerione; Mechanisms of Neurotransmitter Release—M. Lindau; Central Nervous System Neurotransmitters—L. M. Nowak; Structure-Function of the Nicotinic Acetylcholine Receptor—R. E. Oswald.

VETMM 7600 Directed Readings in Pharmacology

Fall, spring, and summer. 1-3 credits each topic. S-U or letter grades. Reading and disc. Field of pharmacology faculty.

Individual members of the graduate field of pharmacology offer directed readings and discussions on pharmacological topics to small groups or to individual students. Topics include but are not limited to Receptor Mechanisms—G. A. Weiland; Biochemical Neuropharmacology—G. A. Weiland; Amino Acid Neurotransmitters—L. M. Nowak; Stimulus-Secretion Coupling—C. M. S. Fewtrell; Cell Calcium—C. M. S. Fewtrell.

Population Medicine and Diagnostic Sciences**VETPM 2990 Undergraduate Research in Epidemiology**

Fall, spring, and summer. 3 credits; minimum 120 hours of lab time expected per 3 credits. Prerequisite: undergraduate standing; one year of basic biology (score of 5 on Biology Advanced Placement Examination of College Entrance Examination Board or BIOG 1000 level) or permission of instructor. J. Scarlett, H. Erb, Y. Grohn, L. Warnick, H. Mohammed, Y. Schukken, and D. Nydam.

Mentored research apprenticeship program designed to give laboratory experience in applied epidemiology to qualified unmatriculated high school students

(participating in Cornell Summer College) or Cornell undergrads. Students are placed in a research laboratory with a designed project under the direct supervision of a research associate (upper-level graduate student, post-doc, or faculty member). Students are graded on preparation, participation in laboratory, academic life, and appropriate acquisition of techniques. At the end of the six-week session, they are expected to give a brief (15- to 20-minute) oral presentation on their work and submit a manuscript in a form suitable for publication. The faculty director of the laboratory has ultimate responsibility for evaluating each student's work and assigning the grade.

VTPMD 6250 Evolutionary Genomics of Bacteria

Spring. 1 credit. Prerequisite: graduate standing. S-U or letter grades. M. J. Stanhope.

Comparative genomics of bacteria is a valuable approach to deriving information on pathogenesis, antibiotic resistance, host adaptation, and genome evolution. This course provides an evolutionary perspective on comparative bacterial genomics, focusing in particular on pathogens of human and agricultural importance. The course includes lectures, discussion of relevant scientific literature, and hands-on bioinformatics exercises.

VTPMD 6640 Introduction to Epidemiology (Graduate)

Fall. 3 credits. Corequisite: BTRY 6010 (College of Agriculture and Life Sciences) or permission of instructor. S-U or letter grades. H. N. Erb.

Lectures and discussion deal with the fundamentals of epidemiology. Topics include outbreak investigation, causal association, data quality, the design and ethical constraints of clinical trials, and infectious-disease epidemiology.

VTPMD 6650 Study Designs (Graduate)

Spring. 2 credits. Prerequisites: VTPMD/VETCS 6640 and BTRY 6010 (College of Agriculture and Life Sciences). S-U or letter grades. H. O. Mohammed.

Design and interpretation of cross-sectional, case-control, and cohort studies (including controlled clinical trial). Design issues include sample size, bias, and relative advantages and disadvantages. Course objectives are to (1) know the difference between different epidemiologic study designs and relative advantages and disadvantages of each; (2) given a problem (usually a field situation), be able to design an appropriate epidemiologic study; (3) be able to effectively analyze and criticize published epidemiologic studies. Consists of lectures on the principles of epidemiologic study design and related issues (sample size calculations, validity and precision, and identification and minimizing of bias); basic analysis of epidemiologic data; and discussion of published epidemiologic studies. These include observational cohort studies (prospective and retrospective), cross-sectional studies, case-control studies, and hybrid studies (ambidirectional and other hybrid designs).

VTPMD 6660 Advanced Methods in Epidemiology (Graduate)

Fall. 3 credits. Prerequisites: VTPMD/VETCS 6650 and BTRY 6020 (College of Agriculture and Life Sciences). S-U or letter grades. Y. T. Grohn.

Concepts introduced in VTPMD 6640 and 6650 are developed further, with emphasis on statistical methods. Topics to be covered include multivariable methods and strategies (simple analysis, stratification, matching, logistic and poisson regression, and survival analysis) for the analysis of epidemiologic data.

VTPMD 7000 Special Projects in Diagnostic Endocrinology

Fall, spring. 1-3 credits. Prerequisite: permission of instructor. Recommended: ANSC 4270. Letter grades only. N. J. Place. Independent study course. Students have the opportunity to research a particular topic in diagnostic/clinical endocrinology of animals.

VTPMD 7010 Special Projects in Infectious Diseases

Fall, spring. 1-3 credits. Prerequisite: permission of instructor. S-U or letter grades. Y. Chang. Provides laboratory experience with attention to specific aspects of infectious disease problems.

VTPMD 7020 Special Topics in Infectious Diseases

Fall, spring. 1-3 credits. Prerequisite: permission of instructor. S-U or letter grades. Y. Chang. Offers a broad exposure to various aspects of infectious diseases.

VTPMD 7040 Master's-Level Thesis Research (Graduate)

Fall, spring. 1-3 credits. Prerequisite: permission of instructor. S-U grades only. Diagnostic Laboratory faculty. Research leading to an M.S. degree.

VTPMD 7070 Clinical Biostatistics (Graduate)

Spring. 2 credits. Minimum enrollment 2; maximum 25. Prerequisite: veterinary residents and graduate students. Letter grades only. Offered odd-numbered years. H. N. Erb, J. M. Scarlett, and H. O. Mohammed. Explains the theory behind and interpretation of parametric and nonparametric statistical techniques commonly used in research/clinical medicine. Students analyze small data sets using a commercial statistical-software package.

VTPMD 7080 Epidemiology Seminar Series (Graduate)

Fall, spring. 1 credit. S-U grades only. Y. T. Grohn. Discusses advanced theoretical and analytical epidemiologic concepts and techniques.

VTPMD 7660 Graduate Research (Graduate)

Fall, spring, summer. Credit TBA. Prerequisite: master's and Ph.D. students; permission of graduate faculty member concerned. S-U grades only. Y. T. Grohn. Enables students outside the section of epidemiology to receive graduate research credits for projects with epidemiological components.

VTPMD 7690 Doctoral-Level Thesis Research

Fall, spring, and summer. Credit TBA. Prerequisite: master's and Ph.D. students in epidemiology. S-U grades only. Y. T. Grohn.

Enables students in the section of epidemiology to receive graduate research credits for their doctoral research.

VTPMD 7990 Independent Studies in Epidemiology

Fall, spring. 1-3 credits. H. N. Erb, Y. T. Grohn, H. O. Mohammed, and J. M. Scarlett.

The purpose of this course is to investigate an epidemiologic topic with one of the instructors. It provides experience in problem definition, research design, and the analysis of epidemiologic data.

FACULTY ROSTER

Abou-Madi, Noha, D.V.M., U. of Montreal (Canada). Lec., Clinical Sciences
 Acland, Gregory M., D.V.M., U. of Sydney (Australia). Prof., James A. Baker Inst. for Animal Health
 Ainsworth, Dorothy M., Ph.D., U. of Wisconsin, Madison. Prof., Clinical Sciences
 Akey, Bruce, D.V.M., U. of Minnesota. Asst. Dean for Diagnostic Operations
 Altier, Craig, Ph.D., Case Western Reserve U. Assoc. Prof., Population Medicine and Diagnostic Sciences
 Antczak, Douglas F., Ph.D., U. of Cambridge (U.K.). Dorothy Havemeyer McConville Professor of Equine Medicine, Microbiology, and Immunology
 Appel, Max J., Ph.D., Cornell U. Prof. Emeritus, Microbiology and Immunology
 Appleton, Judith A., Ph.D., U. of Georgia. Alfred H. Caspary Professor, Microbiology and Immunology
 Baines, Joel, Ph.D., Cornell U. Prof., Microbiology and Immunology
 Balkman, Cheryl, D.V.M., Cornell U. Lec., Clinical Sciences
 Barr, Stephen C., Ph.D., Louisiana State U. Prof., Clinical Sciences
 Bedford-Guaus, Sylvia J., Ph.D., U. of Massachusetts, Amherst. Asst. Prof., Clinical Sciences
 Beyenbach, Klaus, Ph.D., Washington State U. Prof., Biomedical Sciences
 Bezuidenhout, Abraham J., D.V.M., U. of Pretoria (South Africa). Sr. Lec., Biomedical Sciences
 Bicalho, Marcella, D.V.M., U. Federal de Goias (Brazil). Instr., Clinical Sciences
 Bicalho, Rodrigo, D.V.M., U. Federal de Goias (Brazil), Ph.D., Cornell U. Asst. Prof., Population Medicine
 Bischoff, Karyn L., D.V.M., U. of Illinois. Asst. Prof., Population Medicine and Diagnostic Sciences
 Bliss, Stuart, D.V.M., Cornell U. Lec., Clinical Sciences
 Bloom, Stephen E., Ph.D., Pennsylvania State U. Prof., Microbiology and Immunology
 Bowman, Dwight D., Ph.D., Tulane U. Prof., Microbiology and Immunology
 Bowser, Paul R., Ph.D., Auburn U. Prof., Microbiology and Immunology
 Buckles, Elizabeth L., D.V.M., U. of California, Davis. Asst. Prof., Biomedical Sciences
 Bynoe, Margaret S., Ph.D., Einstein College of Medicine. Asst. Prof., Microbiology and Immunology
 Campoy, Luis, D.V.M., U. de Zaragoza (Spain). Lec., Clinical Sciences
 Casey, James W., Ph.D., U. of Chicago. Assoc. Prof., Microbiology and Immunology
 Center, Sharon A., D.V.M., U. of California, Davis. Prof., Clinical Sciences

Cerda-Gonzalez, Sofia, D.V.M., Cornell U. Asst. Prof., Clinical Sciences
 Cerione, Richard A., Ph.D., Rutgers U. Prof., Molecular Medicine
 Chang, Huai Hu, Ph.D., U. of California, San Francisco. Asst. Prof., Biomedical Sciences
 Chang, Yung Fu, Ph.D., Texas A&M U. Prof., Population Medicine and Diagnostic Sciences
 Chun, Kaeshik, Ph.D., Seoul National U. (Korea). Visiting Prof., Microbiology and Immunology
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 Cohen, Paula, Ph.D., U. of London (U.K.). Assoc. Prof., Biomedical Sciences
 Collins, Ruth N., Ph.D., Imperial Cancer Research Center (U.K.). Assoc. Prof., Molecular Medicine
 Coonrod, Scott A., Ph.D., Texas A&M U. Assoc. Prof., James A. Baker Inst. for Animal Health
 Cooper, Barry J., Ph.D., U. of Sydney (Australia). Prof. Emeritus, Biomedical Sciences/Administration
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 Cryer, Marnie FitzMaurice, Ph.D., U. of Pennsylvania. Instr., Biomedical Sciences
 Davisson, Robin, Ph.D., U. of Iowa. Prof., Biomedical Sciences
 Debbie, Dorothy P., Ph.D., Stanford U. Sr. Lec., Microbiology and Immunology
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 Dhupa, Nishi, B.V.M. (Bachelors of Veterinary Medicine), U. of Nairobi (Kenya). Veterinarian, Clinical Sciences
 Dietert, Rodney R., Ph.D., U. of Texas, Austin. Prof., Microbiology and Immunology
 Divers, Thomas J., D.V.M., U. of Georgia. Prof., Clinical Sciences
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 Dubovi, Edward J., Ph.D., U. of Pittsburgh. Prof., Population Medicine and Diagnostic Sciences
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 Duhamel, Gerald E., Ph.D., U. California, Davis. Prof., Biomedical Sciences
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 Earnest-Koons, Kathy, M.S., Pennsylvania State U. Sr. Lec., Microbiology and Immunology
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 Evans, Howard E., Ph.D., Cornell U. Prof. Emeritus, Veterinary and Comparative Anatomy, Biomedical Sciences
 Farnum, Cornelia, Ph.D., U. of Wisconsin, Madison. Prof., Biomedical Sciences; James Law Professor of Anatomy
 Fewtrell, Clare, D.Phil., Oxford U. (U.K.). Assoc. Prof., Molecular Medicine
 Flaminio, Maria Julia, Ph.D., Cornell U. Asst. Prof., Clinical Sciences
 Flanders, James A., D.V.M., U. of California, Davis. Assoc. Prof. and Director, Clinical Sciences

- Fletcher, Daniel J., Ph.D., U. of California, Berkeley. Asst. Prof., Clinical Sciences
- Fortier, Lisa A., D.V.M., Colorado State U. Assoc. Prof., Clinical Sciences
- Fortune, Joanne E., Ph.D., Cornell U. James Law Professor of Physiology, Biomedical Sciences
- Fox, Francis H., D.V.M., Cornell U. Prof. Emeritus, Clinical Sciences
- French, Tracy W., D.V.M., Purdue U. Assoc. Prof., Population Medicine and Diagnostic Sciences
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- Gasteiger, Edgar L., Ph.D., U. of Minnesota. Prof. Emeritus, Biomedical Sciences
- Gelzer, Anna, D.V.M., U. of Bern (Switzerland). Asst. Prof., Clinical Sciences
- Gilbert, Robert O., B.V.Sc., U. of Pretoria (South Africa). Prof. and Assoc. Dean, Clinical Sciences
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- Glaser, Amy, Ph.D., Cornell U. Academic Director, Population Medicine
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- Gonzalez, Ruben, Ph.D., U. of California, Davis. Academic Director, Population Medicine
- Griffin, Brenda, D.V.M., U. of Georgia. Asst. Prof., Population Medicine and Diagnostic Sciences
- Grohn, Yrjo T., Ph.D., Coll. of Veterinary Medicine, Helsinki (Finland). Prof., Population Medicine and Diagnostic Sciences; Department Chair
- Guan, Jun-Lin, Ph.D., U. of California, San Diego. Visiting Professor, Molecular Medicine
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- Hackett, Richard P., Jr., D.V.M., Ohio State U. Prof., Clinical Sciences
- Hansel, William, Ph.D., Cornell U. Liberty Hyde Bailey Prof. Emeritus, Biomedical Sciences
- Harvey, H. Jay, D.V.M., Kansas State U. Assoc. Prof., Clinical Sciences
- Henion, John D., Ph.D., SUNY Albany. Prof. Emeritus, Analytical Toxicology, Population Medicine and Diagnostic Sciences
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- Riis, Ronald C., D.V.M., U. of Minnesota. Prof. Emeritus, Clinical Sciences
- Roberson, Mark S., Ph.D., U. of Nebraska, Lincoln. Prof., Biomedical Sciences; Department Chair

- Russell, David G., Ph.D., Imperial Coll., London U. (U.K.). Prof., Microbiology and Immunology; Department Chair
- Scarlett, Janet M., Ph.D., U. of Minnesota. Assoc. Prof., Population Medicine and Diagnostic Sciences
- Schaefer, Deanna M.W., D.V.M., Texas A&M U. Lec., Population Medicine and Diagnostic Sciences; Academic Director
- Schat, Karel A., Ph.D., Cornell U. Prof., Microbiology and Immunology
- Schimenti, John C., Ph.D., U. of Cincinnati. Prof., Biomedical Sciences
- Schlafer, Donald H., Ph.D., U. of Georgia. Prof., Biomedical Sciences
- Schoeffler, Gretchen L., D.V.M., Texas A&M U. Lec., Clinical Sciences
- Schukken, Ynte H., Ph.D., U. of Utrecht (The Netherlands). Prof., Population Medicine and Diagnostic Sciences; Quality Milk Production Services
- Schwark, Wayne S., Ph.D., U. of Ottawa (Canada). Prof., Molecular Medicine
- Scidmore, Marci, Ph.D., Princeton U. Assoc. Prof., Microbiology and Immunology
- Scott, Danny W., D.V.M., U. of California, Davis. Prof., Clinical Sciences
- Scott, Fredric W., Ph.D., Cornell U. Emeritus Prof., Microbiology and Immunology; Acting Director, Feline Health Center
- Scrivani, Peter V., D.V.M., Cornell U. Asst. Prof., Clinical Sciences
- Sharp, Geoffrey W. G., D.Sc., U. of London (U.K.). Prof., Molecular Medicine
- Shin, Kwang-Soon, Ph.D., Seoul National U. (Korea). Visiting Prof., Population Medicine
- Shin, Sang J., D.V.M., Seoul National U. (Korea). Prof. Emeritus, Population Medicine and Diagnostic Sciences
- Short, Charles E., Ph.D., U. of Turku (Finland). Prof. Emeritus, Clinical Sciences
- Simpson, Kenneth W., Ph.D., U. of Leicester (U.K.). Prof., Clinical Sciences
- Smith, Donald F., D.V.M., U. of Guelph (Canada). Dean Emeritus; Prof., Clinical Sciences
- Smith, Mary C., D.V.M., Cornell U. Prof., Population Medicine and Diagnostic Sciences
- Sondermann, Holger, Ph.D., Max-Planck Inst. (Germany). Asst. Prof., Molecular Medicine
- Stanhope, Michael J., Ph.D., Simon Fraser U. (Canada). Prof., Population Medicine and Diagnostic Sciences
- Stipetic, Korana, D.V.M., U. of Zagreb (Croatia). Instr., Biomedical Sciences
- Stokol, Tracy, Ph.D., U. of Melbourne (Australia). Asst. Prof., Population Medicine and Diagnostic Sciences
- Suarez, Susan S., Ph.D., U. of Virginia. Prof., Biomedical Sciences
- Summers, Brian A., Ph.D., Cornell U. Prof. Emeritus, Biomedical Sciences
- Sutter, Nathaniel B., Ph.D., U. of Washington. Asst. Prof., Clinical Sciences
- Tapper, Daniel N., V.M.D., U. of Pennsylvania, Ph.D., Cornell U. Emeritus Prof., Biomedical Sciences
- Tennant, Bud C., D.V.M., U. of California, Davis. James Law Professor of Comparative Medicine, Clinical Sciences
- Thompson, Belinda, D.V.M., Cornell U. Academic Director, Population Medicine
- Thompson, Margret S., D.V.M., Tufts U. Lec., Clinical Sciences
- Todhunter, Rory J., Ph.D., Cornell U. Prof., Clinical Sciences
- Torres, Alfonso, Ph.D., U. of Nebraska. Prof., Population Medicine and Diagnostic Sciences, Assoc. Dean for Veterinary Public Policy
- Travis, Alexander, Ph.D., U. of Pennsylvania. Assoc. Prof., Biomedical Sciences; James A. Baker Inst. for Animal Health
- Trotter, Eric J., D.V.M., U. of Illinois. Assoc. Prof., Clinical Sciences
- Wade, Susan, Ph.D., Cornell U. Academic Director, Population Medicine
- Wagner, Bettina, D.V.M., Hannover Veterinary (Germany). Asst. Prof., Population Medicine and Diagnostic Sciences
- Wakshlag, Joseph J., D.V.M., Cornell U. Asst. Prof., Clinical Sciences
- Warnick, Lorin D., Ph.D., Cornell U. Associate Dean; Prof., Population Medicine and Diagnostic Sciences
- Wasserman, Robert H., Ph.D., Cornell U. James Law Prof. Emeritus Physiology/Biomedical Sciences
- Weiland, Gregory A., Ph.D., U. of California, San Diego. Assoc. Prof., Molecular Medicine; Department Chair
- Weiss, Robert, Ph.D., Baylor Coll. of Medicine. Asst. Prof., Biomedical Sciences
- White, Maurice E., D.V.M., Cornell U. Prof., Population Medicine and Diagnostic Sciences
- Whittaker, Gary R., Ph.D., U. of Leeds (U.K.). Assoc. Prof., Microbiology and Immunology
- Winand, Nena J., D.V.M., Iowa State U., Ph.D., Cornell U. Sr. Res. Assoc., Molecular Medicine
- Wootton, John F., Ph.D., Cornell U. Prof. Emeritus, Biomedical Sciences
- Yen, Andrew, Ph.D., Cornell U. Prof., Biomedical Sciences

COLLEGE OF ARTS AND SCIENCES

ADMINISTRATION

G. Peter Lepage, dean—255-4146

Walter Cohen, senior associate dean—255-4147

Elizabeth Adkins-Regan, senior associate dean—255-4147

David DeVries, associate dean of undergraduate admissions and education—255-3386

Jane V. Pedersen, associate dean of administration—255-7507

Susan Robertson, director of communications—255-6386

Paul Sawyer, associate dean and director of writing programs—255-4061

PROGRAM OF STUDY

Introduction

The College of Arts and Sciences is a community of about 4,100 undergraduates and 500 faculty members. It is also a graduate school and research center. Altogether it attracts faculty members whose research and scholarly and creative work require first-rate academic facilities and who bring to all their students the profound questioning and exciting ideas of current scholarship. Finally, the college exists within a university of other colleges at Cornell—about 19,500 undergraduate and graduate students and 1,600 faculty members. This wider community provides depth and diversity of applied and professional studies beyond what a college of the liberal arts and sciences alone can offer. Students studying the liberal arts and sciences may draw upon the knowledge and facilities of the other colleges at Cornell to complement their studies. Abundant variety and outstanding quality in many fields, including interdisciplinary fields, and emphasis on individual academic freedom and responsibility give the college and the university their distinctive character.

The richness of the college's undergraduate curriculum is extraordinary; there is no course that all students must take, and there are nearly 2,000 from which they may choose. By choosing courses each semester, students design their own education. They develop known interests and explore new subjects. An education in the liberal arts and sciences means honing one's critical and imaginative capacities, learning about oneself in nature and culture, and gaining experience with views of the world radically unlike one's own. All this is highly individual, and the college relies on each student and faculty advisor to design a sensible, challenging, and appropriate course of study.

Yet the college faculty believes that each student's education should have certain common qualities. These include familiarity with several different ways of knowing that are reflected in the various disciplines and fields of study. In addition to these general areas of knowledge, students acquire effective

writing and quantitative skills, study foreign languages, achieve cultural breadth, and concentrate on one particular field through which they deepen their imaginative and critical thinking as fully as possible. To accomplish these objectives, the college has certain requirements for graduation.

The College of Arts and Sciences awards one undergraduate degree, the Bachelor of Arts degree.

Summary of Requirements

1. First-year writing seminars: two courses. (See "John S. Knight Institute for Writing in the Disciplines," p. 599.)
2. Foreign language: completion of one course at the nonintroductory level or above (Option 1) or at least 11 credits in one language (Option 2).
3. Distribution: nine courses (may overlap with courses counting toward a major).
4. Breadth: two courses (may overlap with courses for distribution, major, or electives).
5. Major (see individual department listings for major requirements).
6. Electives: four or five courses (at least 15 credits) not used to fulfill other requirements (other than the breadth requirements) and not in the major field.
7. Residence: eight full-time semesters, unless a student can successfully complete all other requirements in fewer than eight semesters and meet the additional criteria to accelerate graduation. (See "Acceleration" below.)
8. 34 courses: a 3- or 4-credit course counts as one course. A 2-credit course counts as half a course; a 1-credit course does not normally count toward the requirement; a 6-credit language course counts as one and one-half courses. (See "Courses and Credits" for some 1-credit courses in music, dance, and theatre performance that can be cumulated to count as one-half course.)
9. Credits: a total of 120 academic credits, of which 100 must be taken in the College of Arts and Sciences at Cornell. (See "Noncredit Courses" below for courses that do not count as academic credits or courses.)
10. Physical education: completion of the university requirement (passing a swim test and two 1-credit nonacademic courses). Note: Physical education credit does not count toward graduation or toward the 12-credit minimum required for good academic standing each semester.
11. Application to graduate. (See "Graduation," p. 457.)

Undergraduates are responsible for knowing and fulfilling the requirements for graduation and for alerting the college to any problems with their records. To check on their progress toward the degree, students are urged to consult their advising deans in 55 or 172

Goldwin Smith Hall and to check their DUST (Distributed Undergraduate Student Tracking) reports at <http://data.arts.cornell.edu/as-stus>. The DUST report is updated after each semester to reflect the student's progress in college requirements. To check on their progress in the major, students should consult their major advisors.

Explanation of Requirements

Foreign Language Requirement

The faculty considers competence in a foreign language essential for an educated person. Studying a language other than one's own helps students understand the dynamics of language, our fundamental intellectual tool, and enables students to understand another culture. The sooner a student acquires competence, the sooner it will be useful. Hence, work toward the foreign language requirement should be undertaken in the first two years. Students postponing the language requirement for junior and senior years risk not being graduated in time. Courses in foreign languages and/or literature are taught in the College of Arts and Sciences by the following departments: Africana Studies and Research Center, Asian Studies, China and Asia-Pacific Studies, Classics, German Studies, Linguistics, Near Eastern Studies, Romance Studies, and Russian.

The language requirement may be satisfied in one of the following ways:

Option 1: Passing (a) a nonintroductory foreign language course of 3 or more credits at Cornell at the 2000 level or above or (b) any other nonintroductory course at the 2000 level or above conducted in a foreign language at Cornell. **OR**

Option 2: Passing at least 11 credits of study in a single foreign language (taken in the appropriate sequence) at Cornell.

Any exceptions to these rules will be noted elsewhere in individual department descriptions.

Students whose speaking, reading, and writing competence in a language other than English is at the same level we would expect our entering freshmen to have in English (as shown by completing high school in that language or by special examination during their first year here at Cornell) are exempt from the college's language requirement.

Placement

Entering students who have completed two or more years of high school study in a language, who have been awarded credit for language work at another college or university, or who are native speakers, bilingual, or have spoken the language at home, may enroll in a course in the same language only after being placed by examination. The placement exam may have been taken in high school (SAT II, taken after the last course, or AP, if the score was 4 or 5) or at Cornell (LP test). Being placed by examination into the first course at a nonintroductory level does not earn credit

French			
Placement Tests		Language	Literature
LPF	SAT II	Courses	Courses
below 37.....	below 410.....	1210	
37-44.....	410-480.....	1220	
45-55.....	490-590.....	1230	
56-64.....	600-680.....	2060 2090	
65 and above.....	690 and above.....		CASE required for placement in language.
AP 4 or 5 in language, 3 credits.....			CASE required for placement in language.
AP 4 or 5 in credits.....			CASE required for literature, 3 placement in language.
German			
Placement Tests		Language	Literature
LPG	SAT II	Courses	Courses
below 37.....	below 370.....	1210	
37-44.....	370-450.....	1220	
45-55.....	460-580.....	1230	
56-64.....	590-680.....	2000	
65 and above.....	690 and above.....		CASE required for placement
AP 4 or 5, 3 credits.....			CASE required for placement
Italian			
Placement Tests		Language	Literature
LPI	SAT II	Courses	Courses
below 37.....	below 370.....	1210	
37-44.....	370-450.....	1220	
45-55.....	460-580.....	1230	
56-64.....	590-680.....	2090	
65 and above.....	690 and above.....		CASE required for placement
AP 4 or 5 in language, 3 credits.....			CASE required for placement
AP 4 or 5 in literature, 3 credits.....			CASE required for placement
Spanish			
Placement Tests		Language	Literature
LPS	SAT II	Courses	Courses
below 37.....	below 370.....	1210	
37-44.....	370-450.....	1220	
45-55.....	460-580.....	1230	
56-64.....	590-680.....	2000 2090 2070	
65 and above.....	690 and above.....		CASE required for placement
AP 4 or 5 in language, 3 credits.....			CASE required for placement
AP 4 or 5 in literature, 3 credits.....			CASE required for placement

toward the degree. Degree credit is earned only for demonstrated mastery of work equivalent to the first course at an intermediate level at Cornell and placement into the second intermediate course. Students should seek to satisfy the language requirement in their first years at Cornell. Those with test scores one or more years old may be required to take a Cornell Advanced Standing Examination (CASE) if the instructor deems the student is insufficiently prepared for the level in which he or she has enrolled.

Placement Tests and Advanced Placement Credit

1. The following language placement and advanced standing tests are scheduled at the beginning of each semester:

- Chinese (Cantonese and Mandarin), Hindi, Japanese, and Korean (schedule available from Department of Asian Studies, 350 Rockefeller Hall);
- German (schedule available from Department of German Studies, 183 Goldwin Smith Hall);
- French, Italian, and Spanish (schedule available from Department of Romance Studies, 303 Morrill Hall) [These placement tests are also offered online during the summer.];
- Russian (schedule available from Department of Russian, 226 Morrill Hall).

The advanced standing examination in French, German, Italian, Russian, and Spanish, is called the CASE (Cornell Advanced Standing Examination). Eligibility for the CASE may be determined from the placement tables. In Russian only, all students seeking placement take the CASE.

Native speakers of Spanish who have completed their secondary education in a Spanish-speaking country do not take the CASE. For these students, the Spanish program offers a walk-in service, the Native Language Accreditation for Spanish, in the third week of September and the first week of February. Students interested in this service should contact Brisa Teutli in 414 Morrill Hall, bt54@cornell.edu. Speakers of Spanish who completed their secondary education in a non-Spanish-speaking country are required to present either SAT II or AP or LPS scores for placement, or for eligibility to take the CASE exam.

2. Arabic: departmental examination, Department of Near Eastern Studies, 409 White Hall.
3. Greek: departmental examination, Department of Classics, 120 Goldwin Smith Hall.
4. Hebrew: departmental examination, Department of Near Eastern Studies, 409 White Hall.
5. Latin: departmental examination, Department of Classics, 120 Goldwin Smith Hall.
6. Persian: departmental examination, Department of Near Eastern Studies, 409 White Hall.

7. Turkish: departmental examination, Department of Near Eastern Studies, 409 White Hall.

Distribution Requirements

In satisfying the distribution requirements, students become acquainted with a broad range of subject matter and points of view among disciplines in the college and explore areas that may be entirely new to them. Or, to look at it the other way, as first-year students explore subjects that interest them, they begin to satisfy distribution requirements.

Consequently, first-year students should take courses to prepare for possible majors and to explore subjects new to them and take no course only in order to satisfy a distribution requirement. Although students may complete distribution requirements over eight semesters, they can take advanced courses in subjects they (perhaps unexpectedly) find intriguing only if they have completed the introductory prerequisites. Consequently, students should not postpone satisfying distribution requirements until the last semesters. Once sure of a major, students should consider which distribution requirements are yet unfulfilled and how to fulfill them with courses that complement their overall program. Courses in the major may be applied to the distribution requirements (unless prohibited by one of the restrictions noted under restrictions on applying AP credit, transfer credit, and Cornell courses to distribution requirements).

Students must complete four courses in science and quantitative reasoning, identified below under the categories Physical and Biological Sciences (PBS) and Mathematics and Quantitative Reasoning (MQR). In addition, they must complete five courses of 3 or more credits each from four of the five categories of courses in the humanities and social sciences with no more than three in the same department. The five categories of courses fulfilling the distribution requirements in humanities and social sciences are: Cultural Analysis (CA-AS), Historical Analysis (HA-AS), Knowledge Cognition and Moral Reasoning (KCM-AS), Literature and the Arts (LA-AS), and Social and Behavioral Analysis (SBA-AS). How an individual course is categorized is indicated with the appropriate abbreviation in its description under its department.

It is important to recognize that only courses with the proper designation in the Arts and Sciences section of the catalog can be used toward fulfilling the distribution requirements in Arts and Sciences. Some topics courses and courses offered through the Society for the Humanities, among others, do not count toward distribution.

Students wishing to take an Arts and Sciences course that does not have a rubric assigned to it in this volume should consult their advising dean to ascertain the status of the course and see if it has, in fact, been assigned any distribution rubric after the publication of this volume. Students may not petition to change the rubric of any given course, nor may any faculty member change the rubric of a course for an individual student. Faculty members wishing to change the rubric for a course they teach must petition the Educational Policy Committee for a change in rubric, and that rubric must then be applied to the course for all students in the course.

• Cultural Analysis (CA-AS)

Courses in this area study human life in particular cultural contexts through interpretive analysis of individual behavior, discourse, and social practice. Topics include belief systems (science, medicine, religion), expressive arts and symbolic behavior (visual arts, performance, poetry, myth, narrative, ritual), identity (nationality, race, ethnicity, gender, sexuality), social groups and institutions (family, market, community), power and politics (states, colonialism, inequality).

• Historical Analysis (HA-AS)

Courses in this group interpret continuities and changes—political, social, economic, diplomatic, religious, intellectual, artistic, scientific—through time. The focus may be on groups of people, dominant or subordinate, a specific country or region, an event, a process, or a time period.

• Knowledge, Cognition, and Moral Reasoning (KCM-AS)

Offerings in this area investigate the bases of human knowledge in its broadest sense, ranging from cognitive faculties shared by humans and animals such as perception, to abstract reasoning, to the ability to form and justify moral judgments. Courses investigating the sources, structure, and limits of cognition may use the methodologies of science, cognitive psychology, linguistics, or philosophy. Courses focusing on moral reasoning explore ways of reflecting on ethical questions that concern the nature of justice, the good life, or human values in general.

• Literature and the Arts (LA-AS)

Offerings in this area explore literature and the arts in two different but related ways. Some courses focus on the critical study of artworks and on their history, aesthetics, and theory. These courses develop skills of reading, observing, and hearing and encourage reflection on such experiences; many investigate the interplay among individual achievement, artistic tradition, and historical context. Other courses are devoted to the production and performance of artworks (in creative writing, performing arts, and media such as film and video). These courses emphasize the interaction among technical mastery, cognitive knowledge, and creative imagination.

• Social and Behavioral Analysis (SBA-AS)

Courses in this area examine human life in its social context through the use of social scientific methods, often including hypothesis testing, scientific sampling techniques, and statistical analysis. Topics studied range from the thoughts, feelings, beliefs, and attitudes of individuals to interpersonal relations between individuals (e.g., in friendship, love, conflict) to larger social organizations (e.g., the family, society, religious or educational or civic institutions, the economy, government) to the relationships and conflicts among groups or individuals (e.g., discrimination, inequality, prejudice, stigmas, conflict resolution). Please note that CRP 1100 (The American City) and CRP 1101 (Global City) satisfy SBA but do not count as A&S credit.

• Physical and Biological Sciences (PBS)

In fulfilling the four courses in science and quantitative reasoning, students must take at least two science courses. At least one of these must be from the primary list of courses in science departments in the College of Arts and Sciences:

Primary list:

(The courses listed individually are all cross-listed in an A&S science department.)

Animal Science

4270 Fundamentals of Endocrinology

Anthropology

3710 Human Paleontology

Applied and Engineering Physics

2170 Physics II: Electricity and Magnetism
3300 Modern Experimental Optics
3630 Electronic Circuits
4500 Introduction to Solid-State Physics
4700 Biophysical Methods

Astronomy: all 3- or 4-credit courses

Biological Sciences: all 3- or 4-credit courses (including any combination of two courses from BIO 1101–1104) except BIOG 1115, 2990, 4980; BIOEE 3620; BIOBM 1320, 3990; BIOGD 1320; BIOMI 1720; BIONB 3210, 4200, 4230, 4350, and BIOSM 2040, 2250, 3620, 3710. BIOG 2000 and 4990 require permission from the Office of Undergraduate Biology.

Biological and Environmental Engineering

4710 Introduction to Groundwater

Biology and Society

2141 Biological Basis of Sex Differences
4471 Seminar in the History of Biology
4611 Environmental Policy
4612 Environmental Policy

Chemistry and Chemical Biology

all 3- or 4-credit courses

Cognitive Science

1110 Brain, Mind, and Behavior
3300 Introduction to Computational Neuroscience

Crop Sciences

3970 Environmental Microbiology
4830 Land, Water, Agriculture, and Environment

Earth and Atmospheric Sciences

all 3- or 4-credit courses except 2500, 2900, 3750, 4350, 4940

Electrical and Computer Engineering

4870 Intro to Radar Remote Sensing

Engineering

1220 Earthquake!

Entomology

3250 Insect Behavior
3690 Chemical Ecology
4400 Phylogenetic Systems
4530 Historical Biogeography
4550 Insect Ecology

Feminist, Gender, & Sexuality Studies

2140 Biological Basis of Sex Differences

History

2870 Evolution
4150 Seminar in the History of Biology

Horticulture

2430 Taxonomy of Cultivated Plants
4730 Ecology of Agricultural Systems

Music

- 1466 (previously 2111) Physics of Musical Sound

Natural Resources

- 3030 Introduction to Biogeochemistry
4560 Stream Ecology

Nutritional Sciences

- 4750 Mammalian Developmental Defects

Physics

- all 3- or 4-credit courses

Plant Pathology

- 4090 Principles of Virology

Psychology

- 1110 Brain, Mind, and Behavior
3220 Hormones and Behavior
3240 Biopsychology Laboratory
3300 Introduction to Computational Neuroscience
3320 Biopsychology of Learning and Memory
3960 Introduction to Sensory Systems
4240 Neuroethology
4310 Effects of Aging on Sensory and Perception Systems
4920 Sensory Function

Science and Technology Studies

- 2871 Evolution
4471 Seminar in the History of Biology

Students may select additional science courses from the following **supplementary list**:

Animal Science

- 1100 Domestic Animal Biology I
1150 Domestic Animal Biology II
2120 Animal Nutrition

Anthropology

- 1300 Human Evolution: Genes, Behavior, and the Fossil Record
3270 Environmental Archaeology
3390 Primate Behavior and Ecology
4263 Zooarchaeological Method
4264 Zooarchaeological Interpretation

Applied and Engineering Physics

- 1100 Lasers and Photonics

Archaeology

- 3270 Environmental Archaeology
4263 Zooarchaeological Method
4264 Zooarchaeological Interpretation

Dance

- 3120 The Moving Body: Form and Function

Electrical and Computer Engineering

- 4300 Lasers and Optical Electronics

Engineering (Intro course)

- 1100 Lasers and Photonics

Entomology

- 2010 Alien Empire: Bizarre Biology of Bugs (3 cr.)
2100 Plagues and People (3 cr.)
2120 Insect Biology
2770 Natural Enemies: An Intro to Biological Control (3 cr.)
3150 Spider Biology

Food

- 2000 Intro to Physio & Bio Aspects of Food

Materials Science and Engineering

- 2810 The Substance of Civilization

Natural Resources

- 2010 Environmental Conservation
2100 Introductory Field Biology
3110 Fish Ecology, Conservation, and Management
4200 Forest Ecology

Nutritional Sciences

- 1150 Nutrition and Health
3610 Biology of Normal and Abnormal Behavior

Plant Pathology

- 2013 Magic Mushrooms, Molds, and More
2015 Mushrooms, Molds, and Molecules

Psychology

- 2230 Introduction to Biopsychology
3260 Evolution of Human Behavior
3610 Biology of Normal and Abnormal Behavior

• **Mathematics and quantitative reasoning (MQR)**

In completing four courses in science and quantitative reasoning, students must take at least one of the following courses (note that EDUC 1150 Introductory College Mathematics counts neither toward the college degree nor toward distribution):

Applied Economics and Management

- 2100 Introductory Statistics

Biometry

- 3010 Biological Statistics I

City and Regional Planning

- 3210 Introduction to Quantitative Methods
3280 Quantitative Methods in Policy Planning

Cognitive Science

- 1720 Computation, Information, and Intelligence
4240 Computational Linguistics

Computer Science

- 1110, 1112, 1113, 1114 Introduction to Computing
1700 Computation, Information, and Intelligence
2110 Object-Oriented Programming and Data Structures
2800 Discrete Structures
3110 Data Structures and Functional Programming
3740 Computational Linguistics
4210 Numerical Analysis and Differential Equations
4220 Numerical Analysis: Linear and Nonlinear Equations
4860 Applied Logic

Earth and Atmospheric Sciences

- 4350 Statistical Methods in Meteorology and Climatology

Ecology and Evolutionary Biology

- 3620 Dynamic Models in Biology

Economics

- 3190 Introduction to Statistics and Probability
3200 Introduction to Econometrics
3210 Applied Econometrics
3270 Time Series Econometrics
3680 Game Theory
4760/4770 Decision Theory I and II

Engineering

- 1101 Engineering Applications of ORIE
1700 Computation, Information, and Intelligence
2110 Object-Oriented Programming and Data Structures

Industrial and Labor Relations

- 2100 Introduction to Statistics
2120 Statistical Reasoning

Information Science

- 1700 Computation, Information, and Intelligence

Linguistics

- 4424 Computational Linguistics
4485 Topics in Computational Linguistics

Mathematics

- all 3- or 4-credit courses except 1000 and 1009

Philosophy

- 2310 Introduction to Deductive Logic
3300 Foundations of Mathematics
3310 Deductive Logic
4310 Mathematical Logic
4311 Topics in Logic

Policy Analysis and Management

- 2100 Introduction to Statistics

Psychology

- 3500 Statistics and Research Design

Sociology

- 3010 Evaluating Statistical Evidence

Statistical Science

- 2100 Introduction to Statistics

If students choose two courses from this list to satisfy part of the distribution requirement, those two courses may not have significant overlap. For example, students may not choose two beginning courses in statistics. Nor may they earn credit toward the degree for overlapping courses: AEM 2100 Introductory Statistics, ILRST 2100 Introduction to Statistics, ILRST 2120 Statistical Reasoning, MATH 1710 Statistical Theory and Application in the Real World, PAM 2100 Introduction to Statistics, PSYCH 3500 Statistics Research and Design, SOC 3010 Evaluating Statistical Evidence, STSCI 2100 Introduction to Statistics.

Breadth Requirements

Students must include in their undergraduate program at least one Arts and Sciences course that focuses on an area or a people other than those of the United States, Canada, or Europe and one course that focuses on an historical period before the 20th century. Courses that satisfy the geographic breadth requirement are marked with an @ when described in this catalog. Courses that satisfy the historical breadth requirement are marked with a #. Many courses satisfy both requirements, and students may in fact use the same course to satisfy both. Students may use courses satisfying distribution, major, or elective—but not writing—requirements in satisfaction of either of the breadth requirements. They may also apply Cornell courses (not credit from an examination) conferring proficiency in a non-Western language toward the geographical breadth requirement.

Restrictions on Applying AP Courses and Credit from Other Institutions to the Distribution Requirements

Students may not apply AP credit or transfer credit from another institution to the breadth requirements or to any distribution requirement.

Students who transfer to the college from another institution are under the above rules for advanced placement credit, but are eligible to have credit for post-high school course work taken during regular semesters (not summer school) at their previous institution count toward all distribution requirements. Transfer students receive a detailed credit evaluation when they are accepted for admission.

Restrictions on Applying Cornell Courses to the Distribution and Breadth Requirements

1. First-year writing seminars may not count toward any other college requirement.
2. No single course may satisfy more than one distribution requirement.
3. Students may count courses in their major toward distribution and breadth.
4. Only courses with the proper designation in the Arts and Sciences section of the catalog can be used toward fulfilling the distribution requirements in Arts and Sciences.
5. A student may not petition for alteration of a particular course's distribution rubric, nor may a faculty member change a course rubric for an individual student. The rubric for a course may be changed only if the Educational Policy Committee grants a petition by the course's instructor to change the rubric. If the rubric changes, it does so for the class as a whole and never for an individual student.

The Major

In their last two years, students devote roughly one-half of their time to acquiring depth and competence in a major subject. The major does not necessarily define a student's intellect or character or lead directly to a lifetime occupation, although it sometimes does some of each. Through the major, students focus and develop their imaginative and intellectual capacities through a subject they find especially interesting.

Most departments and programs specify certain prerequisites for admission to the major; they are found on the following pages in the descriptions of each department and program.

Students may apply for acceptance into the major as soon as they have completed the prerequisites and are confident of their choice. This may be as early as the second semester of freshman year, and must be no later than second semester of sophomore year. To apply, they take a copy of their official transcript to an appointment with the director of undergraduate studies in their prospective major. A department or program may refuse admission into the major if the applicant's performance does not meet established standards. A student without a major at the beginning of the junior year is not making satisfactory progress toward the degree and risks not being allowed to continue in the college. That student must meet with an advising dean and may be placed on a leave of absence as early as the first semester of the junior year if he or she has not declared a major.

Available majors

Majors are offered by each of the departments. There are also majors in American Studies, Archaeology, Biology and Society, China and Asia-Pacific Studies, Information Science, Religious Studies, Science of Earth Systems, and Feminist, Gender, and Sexuality Studies.

Some students want to pursue a subject that cannot be met within an established major.

They may plan, with the help of their faculty advisor, an independent major that includes courses from several departments and even colleges. See "Independent Major and College Scholar Program," under "Special Academic Options." Whatever the major—chemistry, math, philosophy, or music—graduates from the College of Arts and Sciences earn the one degree the college awards, a Bachelor of Arts.

Double majors

Only one major is required for graduation. Some students choose to complete two or more majors. No special permission or procedure is required; students simply become accepted into multiple majors and find an advisor in each department. All completed majors are posted on the official transcript. However, even though courses in a second major count among the required 15 credits of electives (see immediately below), double majoring can constrict the variety of electives that might be valuable for an education in the liberal arts and sciences. Students should "double major" only if their intellects and deep interests direct them to do so. If a student majoring in more than one subject decides s/he does not wish to complete the second major, s/he must go to the department and formally withdraw from that major.

Minors

Students may pursue minors in any department in any college that offers them, subject to limitations placed by the department offering the minor or by the students' major. Completed minors will appear on the student's transcript. Not all departments offer minors. Consult the appropriate department or program listing in this *Courses of Study* or contact the appropriate department for information on minors offered and how to pursue a minor.

Electives

Of the 34 courses and 120 credits required for graduation, almost one-third are free electives. How students use these electives frequently makes the difference between an ordinary and a truly interesting course of study. Students must complete at least four courses and at least 15 credits offered outside the major field and not used to fill another requirement except breadth. AP credits not otherwise used may fulfill elective requirements. Students may group electives to complete one of the established interdisciplinary minors. Students may also group electives into a second major. Since only one major is required, students may count courses in a second major as electives. Some students choose to explore a variety of subjects; some develop a concentration in a department or subject outside Arts and Sciences to gain applied training or specialized knowledge.

Residence

The College of Arts and Sciences is a residential community for students who devote their energy and spirit to full-time study. The faculty believes that integrated, full-time study for a defined period best promotes intellectual and creative development and best prepares people for citizenship and careers.

Consequently, eight semesters of full-time study in the College of Arts and Sciences are integral to earning the B.A. degree. Even if the

minimum requirements can be met in fewer semesters, the faculty of the college expects students to take advantage of the resources of the university for eight full semesters and obtain as rich and advanced an education in the liberal arts and sciences as possible. Students may complete their undergraduate degrees with credits earned at other institutions or as part-time or summer students at Cornell only if they have completed their eight full-time semesters of residence or satisfied the criteria listed below under "Part-time study in final semester."

For transfer students from other institutions, each full semester of study at their previous institution counts as one of the eight semesters of residence. However, even if transfer students have completed more than four full semesters at their previous institution, they must spend a minimum of four semesters on the Cornell campus in Ithaca enrolled in the College of Arts and Sciences. Internal transfers from other colleges at Cornell must spend four semesters on campus in Ithaca as students in the Internal Transfer Division or in the college. Only if a transfer student spends at least four semesters in the College of Arts and Sciences can he or she accelerate (see "Acceleration," below).

Approved study abroad, SEA Semester, Urban Semester, FALCON, and Cornell in Washington are considered semesters of residence but not semesters on the Cornell campus. Students may spend no more than two semesters on such programs and must be on campus during their last semester. Dual-degree students spending 10 semesters at Cornell who feel they need three semesters abroad may petition the Academic Records Committee for permission but must demonstrate the academic necessity of the extended time away. Semesters of extramural study in Cornell's School of Continuing Education, semesters of study at other institutions, and summer sessions anywhere do not count as semesters of residence.

Acceleration

The faculty of the college desires that each student achieve depth, as well as breadth, from his or her undergraduate education. Indeed, benefiting from opportunities for advanced, seminar, and independent (sometimes honors) work is what best characterizes undergraduate education in the college. When a student feels he or she does not need eight semesters in order to achieve this depth, the student can apply to be able to accelerate by a term (and in rare cases, two terms), compressing the first four semesters into three (or two), and completing the prerequisites for the major in time to spend four full semesters in the major.

A student desiring to accelerate should meet with an advising dean in the first month of the desired penultimate semester so that he or she may have time to submit the online application to graduate by the deadline. The advising dean will determine the student's eligibility to accelerate. Accelerants must fulfill the following requirements:

1. All graduation requirements except for the residency requirement (120 total credits, 100 Arts and Sciences credits, 34 courses, all college requirements, and the university's physical education requirement).

2. Either condition *a* or *b*:
 - a. 60 credits before beginning their last four semesters in the college and the prerequisites for admission to the major in time to spend *four* semesters in the major.
 - b. 48 credits in College of Arts and Sciences courses numbered 3000 and above and prerequisites for admission to the major in time to spend *four* semesters in the major. No more than three upper-level courses taken in other colleges at Cornell University may count toward the 48 credits and then only if approved as part of the major.
3. 100 credits at Cornell at "C" (not C-) or above. Courses completed with a grade of "S" will count toward the 100 credits. Advanced placement and transfer credits do not count toward this requirement.
4. Students may not use credits earned while on leave of absence to reduce their terms of residence. In other words, they must be eligible to accelerate without applying any credit toward the degree that they earned while on leave.
5. Accelerators may not finish the degree with credits earned through part-time study (unless they meet the guidelines for part-time study), or at an off-campus program, including Cornell in Washington, SEA Semester, Urban Semester, or study abroad. That is, they may not exit through any program other than a regular, full-time Cornell semester in Ithaca.

Students matriculating as first-year students may not compress their undergraduate education into fewer than six semesters of residence. Transfer students, both from other institutions and from other colleges at Cornell, must spend at least four semesters in the college on campus in Ithaca. Acceleration is thus limited to transfer students who enter as sophomores. If a student does not meet the requirements for acceleration, that student may not petition for an exception. Acceleration is, in itself, an exception to the normal rules of the college, and the Academic Records Committee does not grant exceptions to exceptions.

Ninth semester

Students who can graduate in eight semesters should do so. If a worthy academic plan for a full ninth or tenth semester is approved, the student enrolls in the college as a special student for the additional work. Such a status allows enrollment in a full schedule of courses and full access to campus resources for full tuition, but allows financial aid only from loans or outside agencies, not from Cornell funds. Students who need fewer than 12 credits in a ninth or tenth semester to graduate should complete the outstanding courses and pay prorated tuition. Students may spend a ninth semester with Cornell aid only with permission of the Committee on Academic Records. Such permission is normally granted only to the following:

1. Students who have been ill or experienced other untoward circumstances beyond their control.
2. Students who were academically underprepared for the curriculum at Cornell and needed to begin with a lighter

schedule of courses than normal. (See Dean Turner, Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall, about this option.)

Extramural study

Students in good academic standing may take a personal leave of absence and enroll in the School of Continuing Education, but such semesters of extramural study do not count as terms of residence and credits from such semesters may not be used to reduce the terms of residence.

Part-time study in special circumstances

The college and university support students (with financial aid and services) as best they can to make full-time study possible. Occasionally, however, extraordinary but nonfinancial personal, academic, or medical circumstances make studying part-time temporarily necessary and appropriate. Students in good academic standing who face extraordinary situations may petition the Committee on Academic Records for a part-time schedule and proration of tuition in the college.

Prorated tuition in the final semester

Students may complete their degrees by taking fewer than 12 credits and pay prorated tuition at Cornell after fewer than eight semesters of full-time residence only if:

1. They have completed all requirements by the end of the sixth or seventh semester, met the criteria for accelerated graduation, and are remaining to complete study beyond what is required for the degree.
2. They are writing an honors thesis in the eighth semester and can complete all degree requirements by taking exactly two courses, one of which is the thesis itself. They must register for the thesis and one additional course.

A student must see an advising dean to confirm his or her eligibility for prorated tuition and receive a petition to be approved by his or her faculty advisor. The student must specify the number of credits to be taken in the final term, and the faculty advisor must be able to certify that those credits will allow the student to complete his or her graduation requirements. Once the student has submitted the petition to the advising dean for college approval, he or she must see college registrar Sally O'Hanlon in 55 Goldwin Smith Hall to complete the prorated tuition form necessary for the Office of the Bursar. Both the petition form and prorated tuition form must be completed and approved during the first two weeks of the final semester.

Courses and Credits

Students must complete at least 34 full courses (which may include courses students place out of with AP credit), to be graduated—that is, an average of four full courses during each of six semesters and five courses during each of two semesters. Not all courses are full courses. Course equivalencies are as follows:

Counting courses:

- 1-credit courses: Certain 1-credit courses in Music, and in Theatre, Film, and Dance, may aggregate so that each two can count as a half course, and four can count as a full course. Otherwise, single-credit courses do not count as part of the 34.
- 2-credit course = one-half course

3- or 4-credit course = one full course

5-credit BIOGD 2810 (Genetics) = one and one-half course

Other 5-credit courses = one full course each

6-credit language course = one and one-half course

Other 6-credit courses = one full course each

8-credit FALCON courses = 2 full courses each

16-credit FALCON semester = 4 full courses

16-credit Intensive Arabic semester = 4 full courses

Counting credits: Students must complete 120 credits (which may include AP credits). Of the 120, 100 must be from courses taken in the College of Arts and Sciences at Cornell.

Courses that do not count toward the 120 credits required for the degree or toward good standing: The College of Arts and Sciences does not grant credit toward the degree for every course offered by the university. Courses in military training, training as an emergency medical technician, service as a teaching assistant, physical education, remedial or developmental training, precalculus mathematics (including EDUC 115), supplemental science and mathematics offered by the Learning Strategies Center, English as a second language, keyboarding, and shorthand are among those for which degree credit and credit toward the 12 credits required each semester for good academic standing are not given. Students should consult www.arts.cornell.edu/stu-adv/coursesdontcount.php for more information and a list of courses.

Other cases in which a course may not receive credit or count toward good standing include the following:

- A course identified as a prerequisite for a subsequent course may not be taken for credit once a student completes that subsequent course.
- A repeated course. (For more information, see "Repeating courses," below).
- A course with material that significantly overlaps with material in a course a student has already taken, for example, SOC 1101 Introduction to Sociology, and DSOC 1101 Introduction to Sociology; or any of the following statistics courses: AEM 2100 Introductory Statistics, ILRST 2100 Introduction to Statistics, ILRST 2120 Statistical Reasoning, MATH 1710 Statistical Theory and Application in the Real World, PAM 2100 Introduction to Statistics, PSYCH 3500 Statistics Research and Design, SOC 3010 Evaluating Statistical Evidence, STSCI 2010 Introduction to Statistics.

Courses that count toward the 100 required Arts and Sciences credits may include liberal arts courses approved for study abroad during a semester or academic year of full-time study (not summer study), courses taken in certain off-campus Cornell residential programs, courses (usually no more than three) that certain departments accept from other colleges at Cornell as fulfilling major requirements (and substituting for A&S courses), and courses (up to two) that an advisor accepts as part of a completed and formally established cross-college, interdisciplinary minor.

Courses that do not count toward the 100 required Arts and Sciences credits include

credits earned in other colleges at Cornell (except in the cases noted above), credits earned in any subject at institutions other than Cornell, and advanced placement credits. AP credits count as part of the 120 credits and 34 courses required for the degree but not as part of the 100 Arts and Sciences credits and may not be applied to distribution or breadth. AP credits are posted on the transcript during the summer between the freshman and sophomore years, after students have decided whether to accept the credit or forfeit it by taking the Cornell course out of which they had placed. If, subsequently, a student takes the course out of which s/he had placed, the AP credit will be removed because of the overlap in content (For more information on AP credits, please see pages 445–447).

Repeating courses

Students occasionally need to repeat courses. If the instructor certifies that the course content is significantly different, credit is granted a second time. If the content is the same, both grades nonetheless appear on the transcript and are included in any GPA that is calculated, but the course and credit count toward the degree only once. Repeated courses do not count toward the 12 credits required for good standing. Students considering repeating a course under this circumstance should discuss the matter with their advisor and an advising dean. Students who plan to repeat a course must submit a petition to the college registrar, Sally O'Hanlon, 55 Goldwin Smith Hall. If the original course grade was F, no petition is necessary.

Using courses to fulfill more than one requirement:

A course may fulfill more than one college requirement in any of the following situations:

1. A course may be used to fulfill distribution, breadth, and a major requirement (except as noted in earlier sections on restrictions on applying AP credits, transfer credits, and Cornell courses to distribution requirements).
2. A one-semester course in foreign literature (not language) or culture that is acceptable for certifying option 1 in that language may also be applied to the relevant distribution requirement and, if appropriate, to the breadth requirement.
3. Courses may count toward breadth requirements and toward any other requirement except first-year writing seminars.
4. Courses in a second major may count as electives.

Summer session credit

A student may earn credit toward the degree by completing courses in Cornell's summer session or by successfully petitioning for transfer credit for summer courses at other colleges. Students should consult their advisors regarding summer study plans.

Credit for summer courses not taken at Cornell must be approved by the appropriate Cornell department. Approval forms and information are available online, www.arts.cornell.edu, and in the Office of Undergraduate Admissions and Advising, 55 or 172 Goldwin Smith Hall. Students are advised to submit course descriptions, syllabi, and approval forms to the director of

undergraduate studies in the relevant Cornell department for prior approval of each course. Transcripts for completed work at other institutions must be sent to Robin Perry, 172 Goldwin Smith Hall. Credit approved for summer courses away from Cornell (including summer courses abroad) counts toward the 120 credits and 34 courses required for the degree, but not toward the 100 credits required in the college at Cornell. It may not be applied to distribution or breadth requirements but may be applied to elective requirements and to major requirements (with the approval of the department).

Entering students who want to receive credit toward the degree for courses completed before matriculation in a summer session away from Cornell should obtain approval forms as soon as possible and have transcripts sent to Robin Perry, 172 Goldwin Smith Hall. Credits completed in Cornell summer sessions will be awarded automatically.

Summer session at Cornell or elsewhere does not count toward the eight-semester residence requirement. Students are permitted to earn up to 12 credits in one summer.

Transferring credit earned away from Cornell while on leave of absence

See "Leaves of Absence."

Transferring credit (for transfer students from another institution or from another Cornell college)

Transfer students must satisfy all normal requirements for the degree, including eight semesters of full-time study. They must always complete at least 60 credits and 18 courses at Cornell and be in residence on campus in the college for at least four regular semesters (summer session does not count toward the residence requirement). The college evaluates credit and residence earned either at another school or college at Cornell University or at another accredited institution of collegiate rank and determines the number of credits and courses the student may apply toward the various requirements for the bachelor of arts degree at Cornell. In addition, it reevaluates advanced placement credit allowed by another institution, including another college at Cornell. Evaluations of transfer credits are normally provided when students are notified of their admission. Once matriculated in Arts and Sciences at Cornell, transfer students must adhere to the same rules for transferring credit earned on leave as all other students.

SPECIAL ACADEMIC OPTIONS

Degree Programs

The following four programs allow students to alter the regular college or major requirements or to work toward more than one degree.

College Scholar Program

The College Scholar Program is meant to serve students whose interests and talents would benefit from a little more academic freedom than other students have, who demonstrate exceptional promise, and who show the maturity to plan and carry out, with the help of their advisor, a well-designed program of study. College Scholars design idiosyncratic programs: some pursue diverse interests; others integrate a variety of courses

into a coherent subject. Up to 40 students in each class are accepted into the program.

College Scholars must complete 120 credits of course work (100 in the college), 34 courses, the university's physical education requirement, and, unless they receive permission from the program to accelerate, eight full terms of undergraduate study but are not required to fulfill the other usual college requirements for the degree. All college scholars must complete a senior project. Although they are not required to complete or fulfill the general education requirements, members of the College Scholar Advisory Board believe that the spirit of those requirements is good.

Each applicant to the College Scholar Program is asked to write an essay, which is due the last Wednesday of classes in the spring of the freshman year. Students should contact Dean Ken Gabard, Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall, for further information.

Dual-Degree Program with Other Colleges

The Dual-Degree Program enables especially ambitious undergraduate students to pursue programs of study in two colleges. Dual-degree candidates may earn both a Bachelor of Arts degree from the College of Arts and Sciences and: (1) a bachelor of science degree from the College of Engineering; or (2) a bachelor of fine arts degree from the Department of Art in the College of Architecture, Art, and Planning; or (3) a bachelor of science degree in urban and regional studies from the Department of City and Regional Planning in the College of Architecture, Art, and Planning; or (4) a bachelor of science degree in architectural history from the Department of Architecture in the College of Architecture, Art, and Planning. Students enter one of these colleges as freshmen or sophomores and begin the Dual-Degree Program with the second college in the second or, in some cases, the third year. The Dual-Degree Program ordinarily takes five years to complete, and students are eligible for 10 semesters with financial aid. For further information contact Dean Tammy Shapiro in the Office of Undergraduate Admissions and Advising, 172 Goldwin Smith Hall.

Independent Major Program

The Independent Major Program allows students to design their own interdisciplinary majors and pursue a subject that cannot be found in an established major. Proposals for an independent major must be equivalent in coherence, breadth, and depth to a departmental major, well suited to the student's academic preparation, and consistent with a liberal education. Proposals must also be supported by a faculty advisor and are assessed by a board of faculty members. Independent majors substitute for established majors, but students must still satisfy all the other requirements for the bachelor's degree. Students should contact Dean James Finlay, Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall, for further information. Deadlines for submitting independent major proposals are listed on the calendar supplement for the College of Arts and Sciences.

Double Registration with and Early Admission to Professional Schools

Registration in the senior year of the College of Arts and Sciences and the first year of Cornell Law School or the Johnson Graduate School of Management is occasionally possible. A very few exceptionally well-prepared students who have earned 105 credits before the start of the senior year and have been accepted by one of the above-named professional schools may be permitted to register simultaneously in the college and in one or another of these professional schools during the seventh and eighth terms. They earn the B.A. degree after the first year of professional school.

Students with 8 or fewer credits and two or fewer courses to complete may apply to enter the Master's of Engineering program during (but no earlier than) their eighth semester; dual-degree students may enter this program no earlier than the ninth semester. They earn the bachelor degree(s) after one semester of graduate school.

Students interested in the joint program with the Law School, the Cornell Institute for Public Affairs (CIPA), or the Graduate School of Management, or in early admission to the master's of engineering program should apply to the relevant program. All candidates should confirm their eligibility with an advising dean, Office of Undergraduate Admissions and Advising, 172 Goldwin Smith Hall.

Double-registered students must, of course, complete all requirements for the B.A. degree, including 100 credits in Arts and Sciences courses.

Teacher Education

Students at Cornell may pursue teaching credentials in agriculture, biology, chemistry, earth science, general science, mathematics, and physics. Cornell students from any college are encouraged to apply for admission to the Cornell Teacher Education Program during their sophomore or junior year. Those who are admitted complete their undergraduate major in an agricultural science, mathematics or science and a minor (concentration) in education. They are then able to complete a master of arts in teaching (MAT) in one year and earn certification in New York State. Students in agricultural science may be able to complete all certification requirements as undergraduates, although this option is not recommended.

For more information, contact the program director, Deborah Trumbull, at 255-3108 or djt2@cornell.edu.

Special-Interest Options

The following options enable students to pursue special interests within the usual degree programs.

Independent Study

Independent study affords students the opportunity to pursue special interests or research not treated in regularly scheduled courses. A faculty member, who becomes the student's instructor for the independent course, must approve the proposed study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study (proposal forms are available in the Office of Undergraduate Admissions and Advising, 55 and 172 Goldwin

Smith Hall). In one semester students may earn up to 6 credits with one instructor or up to 8 credits with more than one instructor. Students who are being paid for assisting faculty in research *cannot* earn course credit for that work.

Undergraduate Research

An excellent way to benefit from being an undergraduate at a research university, at Cornell in particular, is to become an apprentice in ongoing faculty research. About 400 students participate each year in creating new knowledge and earn independent study credit for what they learn and contribute. They sharpen their critical and creative abilities and test their interest in pursuing a research career. Sometimes they publish their work.

The Cornell Undergraduate Research Board, an undergraduate organization, conducts an annual open house to help students get started in research and an annual forum at which undergraduates present their work. See www.rso.cornell.edu/curb.

Students interested in research should consult the Director of Undergraduate Studies in the department of interest to find out about available opportunities. For more general information on the process of research or on petitioning for independent study credit for research, students should consult Dean James Finlay, Dean Maria Davidis [on leave 2009-2010], or Dean David DeVries, in the Office of Undergraduate Admissions and Advising, or consult www.research.cornell.edu/undergrad.

Language Study

FALCON (Full-Year Asian Language Concentration). FALCON allows students who are interested in the Far East to study Chinese or Japanese exclusively for one year. They gain proficiency in the language and familiarity with the culture. Students who are interested in the Far East should be aware of the opportunities to pursue rapid and thorough beginning studies on campus with the objective of studying abroad in China or Japan. Students interested in this program should contact the Department of Asian Studies, 388 Rockefeller Hall; e-mail: falcon@cornell.edu.

Prelaw Study

Law schools seek students with sound training in the liberal arts and sciences; they neither require nor prefer any particular program of study. Students should therefore study what they love and do well. While doing that, they should also develop their powers of precise, analytical thinking and proficiency in writing and speaking. Students in the College of Arts and Sciences who are applying to law school may consult Dean Heather Struck in the Office of Undergraduate Admissions and Advising, 172 Goldwin Smith Hall.

The college offers a minor in law and society. This program offers a broad scope, complements almost any major, and attracts many students not intending to become lawyers as well as a subset of those intending to.

Premedical Study

The breadth and depth afforded by a liberal arts education are invaluable for students planning medical careers, whether they intend to practice or go into research. Such education has a profound effect on the doctor's

understanding of the world and hence usefulness to patients, and it affords the flexibility of mind that is needed for major research undertakings. Medical and dental schools do not prescribe or even prefer a particular major; they do, however, require particular undergraduate courses, and most students are well advised to begin chemistry in their freshman year. Students who are interested in medical careers are urged to visit the Health Careers Office, 203 Barnes Hall.

The advisor for students in the College of Arts and Sciences who are planning careers in medicine is Dean Janice Turner, Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall.

Off-Campus Programs

Many students find it important to their majors or to their overall academic programs to study off campus or abroad for one or two semesters. When it makes academic sense, the college encourages its students to pursue such studies and grants credit toward the degree for work satisfactorily completed. Students wishing to participate in any off-campus program must petition their advising dean with a list of courses they wish to take during the program and a well-reasoned explanation of why the proposed semester is crucial for their course of study.

Study Abroad

The College of Arts and Sciences encourages study, both on campus and abroad, that provides a greater understanding of the world's peoples, cultures, economies, and environments, and prepares graduates for the challenges of international citizenship in the 21st century. Study abroad is open to students in any major who meet the college requirements and have a strong academic goal. Well-chosen and well-planned study abroad contributes a global or comparative dimension to your chosen field, enhances critical thinking and communications skills, and provides firsthand immersion in and appreciation of another culture. Focused academic work in the right institution abroad can be excellent preparation for advanced study or honors work in your final semesters at Cornell, and can lead to a career with a global component.

Requirements

- acceptance into a major
- area studies course work
- fulfillment of the College of Arts and Sciences residence requirement
- GPA of 3.0 or higher and good academic standing
- language study at the required level
- meet requirements set by the foreign university or program

Cornell Study Abroad students must study alongside degree candidates in their host institutions rather than in self-contained programs that offer courses specially designed for foreigners. The college will approve only those study-abroad proposals that demonstrate realistic and coherent academic goals that are consistent with the philosophy of a liberal arts education.

The college advocates study abroad that enables students to become competent in another language, so that they can engage

fully in daily life in another culture, develop social relationships, and complete formal course work in that language. To study abroad in a country where the host language is not English, the student must demonstrate competence in the language as a prerequisite.

For study abroad in Western Europe and Latin America, students must complete at least **two semesters of the appropriate foreign language at the 2000 level** at Cornell; additional course work is strongly encouraged and will increase students' chances for acceptance into the most highly competitive programs. Consult this catalog for the required level of course work in specific languages. For study abroad in Asia, Eastern Europe, the Middle East, and parts of Africa, course work entirely in the host language is not always practical, even after several semesters of language preparation at Cornell. Students should still plan to complete as much language preparation as possible within the Cornell curriculum, at least one to two years of study, and may be approved for language-intensive programs (at least half of the permitted 15 credits) with appropriate course work in English. If Cornell does not offer instruction in the language of the proposed host country, the student may be approved for a program that combines intensive language instruction with subject course work in English. All students must continue to formally study the language of the host country while abroad.

For study abroad in English-speaking countries, direct university enrollment is approved and expected. Cornell students will engage in a full course of study, generally in their major field, alongside regular degree candidates in the host country. In general, the college requires that at least 50 percent of the classes the student enrolls in be advanced-level course work in their major field.

Students will need to acquire background knowledge of the country or region where they intend to study. At least one area-studies course or one course in the history, culture, economics, politics, or social relations of the country of destination (3 or more credits) **in addition to language study** should be part of every student's preparation for study abroad. Some especially competitive programs require substantial prior course work in the proposed course of study as a prerequisite to acceptance. Students who intend to enhance their major with study abroad may need advanced course work in that field. As with language study, area-studies preparation beyond the minimum is highly recommended.

All A&S students must be formally accepted into a major before going abroad, and should ideally be accepted into a major before beginning the application process. Most students plan a significant amount of academic work toward the major while abroad. Whether or not students intend to earn major credit, the college requires that time spent abroad will not impede their progress toward the degree. The student's faculty advisor and departmental director of undergraduate studies must review and approve the study-abroad plans before the application is submitted to the college.

Study abroad can earn up to 15 A&S credits per semester of full-time course work as long as the curriculum abroad is consistent with that of the college. Completion of one trimester of study earns a maximum of 10

credits. Two terms at Oxford or Cambridge may earn up to 20 credits. You must carry a full course load as defined by the host institution, which should be equivalent to at least 15 credits at Cornell, and all courses must be taken for a letter grade. Courses that fall outside the scope of the liberal arts and sciences may only be taken with the **prior approval** of Dean Wasyliw, and will earn non-A&S credits. Some foreign universities offer courses for visiting students that do not carry any academic credit. Students may **not** earn additional credit for enrolling in extra courses during the semester or year abroad.

Credit for study abroad will be awarded only after completion of the semester abroad, and after the college receives your official transcript. To receive credit, students must fill out a **Request for Credit from Study Abroad** form and submit it to the advising office along with a copy of their transcript. All courses taken abroad will appear on the Cornell transcript and grades earned are reported in the system of the host institution. Grades earned through course work abroad do not become part of the Cornell GPA, since grades at other institutions are rarely equivalent to grades at Cornell. **Students must save all written work from all courses until their grades are received and recorded on their Cornell transcript.**

The maximum length of study abroad that can count toward A&S degree requirements is two semesters, which is also the amount of time recommended for true immersion in another culture and language. Approved semesters away from campus include Cornell in Washington, Urban Semester, and SEA Semester as well as all Cornell Abroad destinations. Students who transfer to Cornell must complete a minimum of four semesters of residence on campus in Ithaca and may not study abroad during any of those four semesters. Internal transfers must complete four semesters of residence on campus in the Internal Transfer Division and/or the College of Arts and Sciences. Students interested in the Cornell in Rome Program should contact Dean Wasyliw.

All applicants for study abroad during the academic year must go through the Cornell Abroad office after being approved by the College of Arts and Sciences. For more information, see Dean Patricia Wasyliw, 55 Goldwin Smith Hall. The full A&S study-abroad policy can be found on the Cornell Abroad web site.

Summer Residential Programs in Archaeology

During the summer months students may participate in a Cornell-sponsored archaeological project. In recent years the program has organized archaeological projects in Central America, Greece, Israel, Italy, Turkey, and New York State. Students should contact the Archaeology Program for information about the sites currently available. Students planning on attending field schools organized by other institutions should contact Professor Thomas Volman, 201 McGraw Hall, or tpv1@cornell.edu.

Marine Science

Shoals Marine Laboratory is a seasonal field station that offers more than 30 college courses that award Cornell credit and paid internships, a variety of courses and experiences designed to introduce

undergraduates to marine science. The laboratory is located on Appledore Island, six miles off the Maine/New Hampshire coasts. Students should contact the Shoals Marine Laboratory Office, G14 Stimson Hall, or e-mail shoals-lab@cornell.edu, for further information.

Cornell in Washington

The Cornell in Washington program offers students from all colleges in the university an opportunity to earn full academic credit for a semester in Washington, D.C. Students take courses from Cornell faculty members, conduct individual research projects, and work as externs. The Cornell in Washington program offers two study options: (1) studies in public policy, and (2) studies in the American experience. The program also offers unique externship opportunities: students serve as externs in a federal agency, congressional office, or nongovernmental organization and take part in a public policy or humanities seminar. They define and carry out individual research projects under the supervision of Cornell faculty members. Potential externships are arranged through, and approved by, the Cornell in Washington program. For further information, see p. 22 or inquire at M101 McGraw Hall, 255-4090.

Off-campus Programs Offered by Other Colleges

Students wishing to participate in the Urban Semester program, Capital Semester in Albany program, or the Earth and Environmental Systems (EES) semester in Hawaii must petition their advising dean with a list of the courses they wish to take during the program and a well-reasoned explanation of why the proposed semester is crucial for their major course of study. Students interested in the Cornell in Rome program should consult Dean Patricia Wasyliw in 55 Goldwin Smith Hall.

ACADEMIC INTEGRITY

Academic integrity is the heart of intellectual life—both in learning and in research. All members of the university community simply must support each other's efforts to master new material and discover new knowledge by sharing ideas and resources, by respecting each other's contributions, and by being honest about their own work. Otherwise the university will fail to accomplish its most central and important goals.

Cornell's Code of Academic Integrity and policy about acknowledging the work of others are among the documents new students receive. Students should read them carefully and not assume they understand what integrity and cheating are and are not. Academic integrity implies more here at the university than it usually did in high school. The standards of integrity are those that prevail in professional life. This means that students must acknowledge and cite ideas they adopt from others (not just direct quotations) and help they receive from colleagues or parents. With productive emphases on collaborative learning and writing, students must understand the general standards and policies about academic integrity and be sure they understand the expectations in individual courses as well. When in doubt, ask the instructor. For more information, consult cuinfo.cornell.edu/Academic/AIC.html.

Forgery or Fraud on Forms

Forging signatures or credentials on college forms is an academic offense and constitutes academic fraud. In all cases of forgery on academic forms, the effect of the forged documents shall be negated; such incidents will be recorded in the Academic Integrity Hearing Board's confidential file for forgeries. If the student forges more than once, or if the forgery would advance the student's academic standing unfairly or fraudulently, or if for any reason the situation requires some response in addition to the uniform penalty, the Academic Integrity Hearing Board might recommend further action, such as a notation on the student's transcript, suspension, or dismissal.

ADVISING

The following advisors and offices provide academic advising, help with problems, and information on college procedures and regulations.

Pre-Major Advisors

Each new student is assigned a faculty advisor. Advisors help students plan programs of study and advise them about ways to achieve their academic goals. Advisors may also help students with study or personal problems or may direct them to other offices on campus where help is available. Academic difficulties may frequently be solved or avoided if students and advisors recognize and address problems early.

Advisors and new advisees meet first during orientation week to discuss course selection. New students are encouraged to see their advisors again early in the semester, before it is too late to drop courses, to discuss their academic progress and to become better acquainted. Advisors and advisees meet at least once each semester to discuss courses for the following semester, and more often if advisees wish to discuss academic or personal issues or to petition for an exception to college rules.

Major Advisors

After acceptance into a major, each student is assigned a faculty advisor in his or her department, with whom the student shapes and directs the course of study. The advisor eventually certifies the completion of the major. Students should consult their major advisor about all academic plans, including honors, study abroad, acceleration, and graduate study. The advisor's support is especially important if a student petitions for an exception to the normal procedures or requirements.

Student Advisors

Student advisors pass on lore about the college and life at Cornell and help new students become oriented to the university.

Office of Undergraduate Admissions and Advising

This office, located in 55 Goldwin Smith Hall, 255-5004, and 172 Goldwin Smith Hall, 255-4833, is a resource for faculty and student advisors and for individual students and their parents. Advising deans are available to help students define their academic and career goals, to help with special academic options

and exceptions to college rules, and to help when problems arise:

- David DeVries, associate dean for undergraduate admissions and advising and undergraduate research, 255-3386
- Juliette Corazón, minority students and liaison to Latino Studies Program, 255-4833
- Maria Davidis [on leave 2009-2010], juniors, seniors, Tanner Dean's Scholars, Rawlings Cornell Presidential Research Scholars, Mellon Mays Fellows, undergraduate research, and postgraduate fellowships, 255-4833
- Christa Downey, career services, 255-4166
- James Finlay, first- and second-year students, Independent Major Program, undergraduate research, and peer advisors, 255-5004
- Ken Gabard, first- and second-year students and College Scholar Program, 255-5004
- Ray Kim, juniors, seniors, student ambassadors, 255-4833
- Irene Komor, career counseling, 254-5295
- Clare McMillan, first- and second-year students, students with disabilities, Tanner Dean's Scholars, 255-4833
- Diane J. Miller, career services, 255-6924
- Sally O'Hanlon, registrar, 255-5794
- Myra Sabir, juniors, seniors, internal transfers, Mellon Mays Fellows, and minority students, 255-4833
- Tammy Shapiro, juniors, seniors, dual-degree students, 255-4833
- Arthur Smith, first- and second-year students
- Heather Struck, juniors, seniors, prelaw students, 255-4833
- Janice Turner, minority students and pre-med students, 255-9497
- Patricia Wasyliv, first- and second-year students, academic integrity, study abroad, 255-5004

Committee on Academic Records

The college faculty's standing Committee on Academic Records has two main tasks: (1) to decide on students' petitions for exceptions to college requirements or rules and (2) to review the records of students who fail to maintain good academic standing and to take appropriate action. It accomplishes both those tasks without formulae and with attention to each individual situation. Its overriding goal is to help students achieve the best undergraduate education possible.

Petitions

The college faculty takes graduation requirements seriously, and the faculty's Committee on Academic Records virtually never waives a requirement outright. However, some students, with the support of their advisors, propose structuring their educations or fulfilling the spirit of college requirements in ways other than the specified norms. The Committee on Academic Records decides on such requests. Students who find that their undergraduate education would be better realized by satisfying requirements or proceeding in a way that requires an exception to normal rules, for example, a substitution for the language requirement,

should meet with an advising dean in the Office of Undergraduate Admissions and Advising. The deans are expert in the college's expectations and procedures and can help the student formulate a petition, if appropriate. The committee decides petitions on the basis of their educational merit.

Actions

The College of Arts and Sciences has no minimum grade requirement for graduation beyond the guideline that at least 100 Cornell credits of the 120 total required for graduation be passed with grades of C (not C-) or above. Consequently, only through actions of the Committee on Academic Records, described below under "Academic Standing," does the college maintain the quality of the degree and attend to individual situations when things academic are not going well.

REGISTRATION AND COURSE SCHEDULING

Enrollment in Courses in the College of Arts and Sciences

New Students

During orientation week, new students attend briefings and other information sessions, meet with faculty advisors, and sign into courses. The college reserves spaces in courses for its incoming students.

Continuing Students

Continuing students select and schedule up to five courses of 3 or more credits and as many 1- and 2-credit courses as they would like during the semester before the one in which the courses will be taken. Students who do not "pre-enroll" during the designated period must wait until the beginning of the semester and may have difficulty securing places in the courses they most want. Before enrolling in courses, students plan their programs and discuss long-range goals with their faculty advisors. In addition, all students are welcome to discuss programs and plans with an advising dean in the Office of Undergraduate Admissions and Advising, 55 or 172 Goldwin Smith Hall.

At the beginning of each semester, students find their schedules on Student Center at www.studentcenter.cornell.edu. Periodically during the semester, and particularly just before the 3-, 7-, and 12-week deadlines, they should confirm the accuracy of their records.

Limits on Numbers of Courses and Credits

To meet the 34-course requirement, students must normally take four courses during each of six semesters and five courses during each of two semesters. To meet the 120-credit requirement, students must average 15 credits per semester. (Note: AP credit and/or summer credits may reduce the average numbers of courses and credits required each semester.)

Minimum number of credits per semester

To maintain good academic standing as a full-time student, students must complete at least 12 degree credits per semester; if for compelling personal or academic reasons students need to carry fewer than 12 credits, they should consult their faculty advisor and

an advising dean. Permission is by petition only, and after the first semester, such permission is given only in extraordinary circumstances.

Maximum number of credits per semester

First-year students must petition to enroll in more than 18 credits; other students may enroll in up to 22 credits if their previous semester's average was 3.0 or higher and they are in good academic standing. No more than 22 credits may be taken in a regular semester without permission of the college faculty's Committee on Academic Records. Students who fail to receive approval for excess credits from the committee may count only 18 or 22 credits, depending on their previous semester's average, toward the degree for that semester. Students taking summer courses may earn no more than 12 credits in any one semester.

Attendance

Attendance in classes is expected. Absences are a matter between students and their instructors. If a student cannot attend classes because of illness or family crisis, the Office of Undergraduate Admissions and Advising will notify instructors at the request of the student or the family. Nonetheless, the student must arrange to make up examinations or other work with each instructor. A student who will be absent because of religious holidays or athletic competitions must discuss arrangements for making up work with his or her instructors well in advance of the absence. A student who must miss an examination must also consult with the professor in advance. Alternative arrangements are at the discretion of the instructor.

Student athletes should discuss scheduled absences with their instructors at the beginning of the semester. Courses vary in their tolerance of absences. Instructors are not obligated to approve absences for purposes of participating in extracurricular activities, although most will be as flexible as is sensible for a student's academic program.

Adding and Dropping Courses

After course enrollment (also known as pre-enrollment), students may not adjust their schedules until the new semester begins. During the first three weeks of the semester, students may change courses without petitioning. (Note: the add period for first-year writing seminars is only two weeks.)

After the third week of classes, students must petition to add courses and may add them only for a letter grade. They may drop courses through the seventh week of the semester if no issue of academic integrity is at stake. Between the seventh and 12th weeks students may petition to withdraw from courses, if (1) the instructor approves; (2) the advisor approves; (3) an advising dean approves; (4) the drop does not result in fewer than 12 credits; and (5) no issue of academic integrity is at stake. Students must meet with an advising dean to obtain petition forms.

Courses officially dropped after the seventh week will be noted on the transcript by a "W" where the grade would normally appear. **This is a matter of record and cannot be petitioned. Petitions to withdraw from courses may not be submitted after the end of the 12th week in the semester.** Deadlines for short courses will be adjusted according to the length of the courses.

The effective date of all course changes will be the day the student submits all completed paperwork to the Office of Undergraduate Admissions and Advising.

GRADES

Letter Grades

See "Grading Guidelines," pages 15–16.

S–U Grades

The S–U (satisfactory–unsatisfactory) option allows students to explore unfamiliar subjects or take advanced courses in subjects relatively new to them without being under pressure to compete with better-prepared students for high grades. Students are expected to devote full effort and commitment to a course and complete all work in a course they take for an S–U grade. The S–U option is contingent upon the instructor's willingness to assign such grades. **Students must select their grading option and obtain the instructor's approval for the S–U option during the first three weeks of the semester. No exceptions to this deadline are permitted, and consequently students adding courses after the third week of the semester must add them for a letter grade.** After the third week of the semester, students may not petition for a grade option change, unless the course in question has been taken for S–U and is now part of the student's major. If, subsequently, the student withdraws from that major, the grade option will revert to its prior state. Students should note that a grade of S is equivalent to a grade of C– or higher; a grade of U, which is equivalent to any grade below C–, is a failing grade equal to an F. S means the student receives the credit specified for the course. U means no credit is given. A few courses in the college are graded exclusively S–U; in that case, the final grade appears on the transcript as SX or UX.

Prerequisite courses for graduate school and courses counting toward the major should not be taken for an S–U grade, unless the department grants permission. Students may elect the S–U option in courses used to satisfy distribution and elective requirements, provided that such courses do not also count toward major requirements or serve as prerequisites for admission to the major. First-year writing seminars and most language courses disallow the S–U option. In any case, students are advised to use the S–U option sparingly, if they intend to apply to graduate school or for transfer to another college. In addition, second-semester seniors in particular are advised to use the S–U option carefully: A student receiving a D in a nonmajor course he or she needs for graduation will still be graduated if that course has been taken for a letter grade. If, however, the student has taken the course S–U, the D will be recorded as a U and the student will be unable to be graduated on the desired degree date. There is no limit on the number of courses each semester for which students may elect the S–U grade, but within the 120 credits required for the degree, a minimum of 80 credits must be in courses for which a letter grade was received.

Note of Incomplete

An incomplete (INC) signifies that a course was not completed before the end of the semester for reasons beyond the student's control and acceptable to the instructor. Students must have substantial (normally at least 50 percent) equity in the course, be able to complete the remaining work, and have a passing grade for the completed portion. When a grade of incomplete is reported, the instructor submits a form stating what work must be completed, when it must be completed, and the grade (or permanent—"frozen"—incomplete) earned if the work is not completed by that date. When a final grade is determined, it is recorded on the official transcript with an asterisk and a footnote explaining that this grade was formerly an incomplete.

Students should be aware that INCs are interpreted as credits not passed during a given semester. If a student's INC takes his or her record below 12 credits in a given semester, the student risks being placed on warning or on leave by the Academic Records Committee. If placed on leave, the student must complete the INC before being allowed to return, and readmission will be permitted only at the beginning of a given semester. If the INC is not completed by the beginning of a regular academic term, the student may not register for that term. Students must resolve (make up or "freeze") any incompletes with their instructors before graduation.

Note of R (Yearlong Courses)

R is recorded for satisfactory progress at the end of the first semester of a two-semester course. Students enroll in such courses both semesters. The grade recorded at the end of the second semester evaluates the student's performance in the course for the entire year and will also replace the grade of "R" for the first semester of the course.

Students enrolled in an R course for the thesis may occasionally wish or feel compelled not to complete that thesis. In order to drop the thesis but continue with an independent study, the student should see Sue Downes in 172 Goldwin Smith Hall for the appropriate forms.

Grade Reports

Grade reports are available online on Student Center at www.StudentCenter.cornell.edu; they are not mailed to students. Students should periodically check their courses and grades to be sure that they are recorded correctly.

Class Rank

The college does not compute class rank.

Dean's List

Inclusion on the Dean's List is an academic honor bestowed by the dean of the college semester by semester. Based on grades, the criteria include about the top 30 percent of students and vary with the number of credits the student completes. The criteria are subject to slight changes from semester to semester and are available at www.arts.cornell.edu/stu-adv/deanslist.asp and in the Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall.

ACADEMIC STANDING

Students are in good academic standing for the semester if they successfully complete at least 12 degree credits by the end of the semester and earn no more than one D and no F or U grades. If a student completes only three courses, all grades must be above D. In addition, students are expected to make satisfactory progress toward satisfying requirements for the degree and to earn grades of C (not C-) or better in at least 100 of the 120 credits for the degree. Courses listed under "courses that do not count toward the degree" do not count toward good academic standing in a semester.

Academic Actions

Students who are not in good academic standing will be considered for academic action by the college faculty's Committee on Academic Records or by one of the advising deans of the college. Students are urged to explain their poor academic performance and submit corroborating documentation. Students may appeal a decision or action of the committee if they have new relevant information and documentation. They must consult an advising dean about appealing.

Warning

Any student who fails to maintain good academic standing will, at a minimum, be warned. A warning is posted on a student's college record but is not reported to the university registrar and does not appear on official transcripts.

Required leave of absence

A student in serious academic difficulty may be required by the faculty Committee on Academic Records to take a leave of absence, normally for a full year. Usually, but not always or necessarily, the Committee on Academic Records warns students before suspending them. Before being allowed to return and reregister in the college, students must document what they did on leave and how they resolved their problems, and they must submit a plan for completing the degree. In some cases students will be required to furnish evidence that they are ready to return or satisfy other conditions before being allowed to reregister in the college. Students who request to return in less than a year must present to the committee extraordinarily convincing evidence of their readiness to return. "Required leave" is posted on the student's official transcript.

Required withdrawal

The faculty Committee on Academic Records may dismiss a student from the college because of a highly unsatisfactory record for one semester or for failure to make satisfactory overall progress in grades, credits, or degree requirements. This action expels the student permanently from the college. "Required withdrawal" is posted on the student's official transcript.

Leaves of absence (LOAs)

Most leaves of absence are not required. Taking time off from college to gain experience or funds, or to find direction, is sometimes useful. In general, students arrange in advance for leaves to take effect the following semester. Students in good academic standing must see an advising dean to obtain

and submit a leave of absence statement, to be approved by the advising dean. Students may take a personal leave of absence up to the beginning of the semester (defined as the first day of classes). Students not in good academic standing may pursue a conditional leave of absence from the college up to the first day of classes. If medical issues are involved, students must consult Gannett: Cornell University Health Services about the advisability of a medical leave of absence.

Any student who wishes to take a leave of absence must consult with an advising dean in the Office of Undergraduate Admissions and Advising, 55 or 172 Goldwin Smith Hall.

Students sometimes find it necessary to take a leave of absence at some point during the semester. In addition to the serious financial consequence of taking leaves after the semester has begun (see the Proration Schedule for Withdrawals and Leaves of Absence in the General Information section of this catalog), all leaves taken during the semester are granted at the discretion of the college and must, if granted, be conditional leaves of absence. Students must discuss their need for a LOA with an advising dean.

Leaves of Absence are of four types:

1. *Personal leaves* impose no conditions concerning reentering the college except for the five-year limit (see "Return from Leave," below). Readmission is automatic upon written request made by the student to his or her advising dean by August 1 for a fall semester, or January 1 for a spring semester. The college is not obliged to re-admit any student who does not meet the deadline for a given semester.
2. *Conditional leaves* are granted by the college for students who wish to take a leave but are not in good academic standing, or for students who wish to take a leave during the current semester. In consultation with the student, an advising dean and the Committee on Academic Records set the conditions for the student's return. Students may not return from conditional leaves for at least two semesters and/or until specific and individual conditions, such as completing unfinished work, have been met, and permission to return must be granted by the Committee on Academic Records. Students may be granted conditional leaves after the 12th week of a semester only under extraordinary circumstances and with the approval of the faculty's Committee on Academic Records.
3. *Medical leaves* are granted by the college only upon the recommendation of Gannett Health Services, and are usually issued for at least six months. The college may attach additional conditions appropriate to the individual situation. The student's academic standing is also subject to review at the time of the leave and on return. Students must then receive clearance from both Gannett and the college to be readmitted to study. Students wishing to return from a medical leave should contact Gannett several months in advance to initiate the return process, and only then contact the college.

4. *Required leaves.* The Committee on Academic Records may require a leave of absence if a student is not making satisfactory progress toward the degree. See "Academic Actions."

Students on conditional or required leaves of absence (LOA) may not attend any classes at Cornell through the School of Continuing Education and Summer Sessions. Students on a medical LOA may not register for classes at Cornell unless they obtain the permission of the college and a recommendation from Gannett. Courses taken without college permission will not count toward degree requirements.

Return from Leave

Students wishing to return from leave must contact the college and, where appropriate, provide documentation that all conditions for readmission have been satisfied. All requests for readmission must be received by the college by August 1 for the fall semester and January 1 for the spring semester. In the case of conditional and/or medical leaves, students must consult well in advance of those dates with both the college and Gannett. On readmission, the student's graduation date will be recalculated to account for the time spent away. Five years is the maximum length of time a student may be on leave before being withdrawn from the college.

Transferring Credits Earned While on Leave

Students who take courses elsewhere in the United States while on leave may petition to have credits transferred. Petitions are available in 55 and 172 Goldwin Smith Hall and at www.arts.cornell.edu. Approval depends on acceptable grades and the judgment of the relevant departments about the quality of the courses. If approved, these credits may be applied toward the 120 credits and 34 courses needed for graduation, but not toward the 100 credits required in the college. They may be applied to elective requirements or to the major, as allowed by the department, but not to any of the breadth or distribution requirements. **Credits earned during a leave do not count toward the eight semesters of residence and may not be used to reduce the terms of residence below the required eight. See "Residence."**

Study Abroad and International Students on Leave of Absence

Study abroad undertaken during a leave of absence will not receive academic credit. International students on leave of absence from the College of Arts and Sciences may enroll in courses at a college or university in their home country **only**, as such enrollment is not defined as study abroad. They may petition for transfer of credit upon return to Cornell. If approved, the credit will count as described in the previous paragraph.

Withdrawals

A withdrawal is a permanent severance from the university and from candidacy for the degree. Students planning to withdraw should consult an advising dean. Students not requesting a leave and failing to register for a semester will be withdrawn from the college. The college faculty's Committee on Academic Records may require a student to withdraw because of a highly unsatisfactory academic record, and the college may require a student

to withdraw because of failure to register in a timely fashion.

Transferring within Cornell (Internal Transfer)

Internal transfer from one college or school at Cornell into another is attractive for students whose intellectual interests change (or become more focused). Students who wish to transfer should discuss their eligibility with a counselor in the new school or college.

In some cases, students who want to transfer into the College of Arts and Sciences may transfer directly. In other cases, they may be referred to the Internal Transfer Division. During the semester immediately preceding transfer into the College of Arts and Sciences, students must complete at least 12 credits of courses in the College of Arts and Sciences with a 3.0 average and with no grades of *Incomplete*, S–U grades (unless only S–U grades are offered for that particular course), or grade below C (C– is below C). Satisfying this minimum requirement does not, however, guarantee admission. Admission to the college is based on consideration of the student's entire record at Cornell and the high school record, not just the work of one semester. It is also based on ability to complete the B.A. degree within a reasonable time. Internal transfers are required to spend four semesters in Arts and Sciences and thus should initiate the transfer process no later than the second semester of sophomore year. They also must complete at least 100 credits at Cornell with grades of C (not C–) or above. Interested students should see Dean Ray Kim, 172 Goldwin Smith Hall.

GRADUATION

The Degree

The College of Arts and Sciences grants only one degree (no matter the student's major): the A.B. (or B.A.). A.B. is the abbreviation of the Latin name for the degree, "artium baccalarius," or translated into English, B.A., "Bachelor of Arts."

Application to Graduate

In the first semester of their senior year, students will receive an e-mail instructing them to complete an online application to graduate. The application is intended to help seniors identify problems early enough in the final year to make any necessary changes in course selection to satisfy those requirements. *Nonetheless, meeting graduation requirements is the student's responsibility*; problems that are discovered, even late in the final semester, must be resolved by the student before the degree can be granted. Students are responsible for checking their DUST reports and transcripts and alerting their advising deans of any problems with the academic record.

Degree Dates

There are three degree dates in the year: May, August, and January. Students who plan to graduate in August may attend graduation ceremonies in the preceding May. Students graduating in January are invited to a special recognition ceremony in December; they may also attend graduation ceremonies the following May.

Honors

Bachelor of Arts with Honors

Almost all departments offer honors programs for students who have demonstrated exceptional accomplishment in the major and succeeded in research. The honors programs are described by individual departments. The degree of Bachelor of Arts *cum laude*, *magna cum laude*, or *summa cum laude* will be conferred upon a student who, in addition to having completed the requirements for the degree of Bachelor of Arts, has been recommended for a level of honors by the major department, the Independent Major Program, or the College Scholar Program. Concentrations do not offer honors programs.

Bachelor of Arts with Distinction

The degree of Bachelor of Arts with distinction in all subjects will be conferred on students who have completed the requirements for the degree of Bachelor of Arts, if they have met the following requirements by the end of their final semester:

1. completed at least 60 credits while registered in regular sessions at Cornell;
2. achieved a GPA in the upper 30 percent of their class at the end of the seventh semester, or next-to-last semester for transfers and accelerants;
3. received a grade below C– in no more than one course;
4. received no failing grade;
5. have no frozen Incompletes on their records; and
6. maintained good academic standing, including completing a full schedule of at least 12 credits, in each of their last four semesters. (Students who have been approved to be pro-rated for the final semester in order to complete an honor's thesis are considered to be in good academic standing and therefore eligible to receive distinction.)

CALENDAR SUPPLEMENT

All of the dates in the university calendar at the front of this volume apply to all Cornell students. Listed below are some additional dates that are of importance for students in the College of Arts and Sciences.

	Fall 2009	Spring 2010
Last day for adding courses without petition	Sept. 18	Feb. 15
Last day for adding a first-year writing seminar	Sept. 11	Feb. 5
Last day for changing grade option to S–U or letter	Sept. 18	Feb. 15
First deadline for submitting independent major requests. Go to 55 Goldwin Smith Hall for further information.	Sept. 29	Feb. 23
Last day for dropping courses without petition	Oct. 16	March 15

Last day to petition to withdraw from a course	Nov. 20	April 23
Second deadline for submitting independent major requests. Go to the Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall, for further information.	Nov. 24	April 6
Deadline for requesting internal transfer to the College of Arts and Sciences for the following semester.	Dec. 5	May 1
Deadline for applying to the College Scholar Program.		April 29
Deadline for applying Office, to study abroad	See Cornell Abroad Office, 474 Uris Hall	
Course enrollment (preregistration) for the following semester.	TBA	TBA

Departments, Programs, and Courses

AFRICANA STUDIES AND RESEARCH CENTER

S. Hassan, Director (254-1592); N. Assié-Lumumba, A. Bekerie, C. Boyce Davies, J. Byfield, L. Edmondson, G. Farred, T. Gosa, R. Harris, A. Mazrui, A. Nanji, R. Richardson, J. Turner. Offices: 310 Triphammer Road, 255-4625 or 255-4291.

The Africana Studies and Research Center is concerned with the examination of the history, culture, intellectual development, and social organization of Black people and cultures in the Americas, Africa, and the Caribbean. Its program is structured from an interdisciplinary and comparative perspective and presents a variety of subjects in focal areas of history, literature, social sciences, and African languages. African languages such as Swahili and Yoruba are consistently offered fall and spring semesters and some are also taught during summer/winter session.

The center offers a unique and specialized program of study that leads to an undergraduate degree through the College of Arts and Sciences and a graduate degree, the Master of Professional Studies (African and African-American), through the university's Graduate School.

A student may major in Africana Studies; however, another attractive alternative is the center's minor in Africana Studies. This program enables the student to complete a major in any of the other disciplines represented in the college while at the same time fulfilling requirements for a minor in Africana Studies. This requires only a few more credits than is usually the case when one completes a single major course of study. Courses offered by the center are open to both majors and nonmajors and may be used to meet a number of college distribution requirements, including historical/temporal breadth (#) and geographical breadth (@) requirements, such as first-year writing seminars, languages, expressive arts, humanities, social sciences, and history.

The center also brings distinguished visitors to the campus, sponsors a new Book/Black

Author series, a colloquium series, and houses its own Africana library, the John Henrik Clarke Library.

The Africana Major

The undergraduate major offers interdisciplinary study of the fundamental dimensions of the African American, African, and Caribbean experiences. Because of the comprehensive nature of the program, it is to the students' advantage to declare themselves Africana majors as early as possible. The following are prerequisites for admission to the major.

Students should submit:

1. a statement of why they want to be an Africana Studies major;
2. a tentative outline of the area of study they are considering (African, African American, or Caribbean) for the major; and
3. a full transcript of courses taken and grades received.

The center's director of undergraduate studies will review the applications and notify students within two weeks of the status of their request.

After acceptance as a major in the Africana Center, a student must maintain a C+ cumulative average in the center's courses while completing the major program. The Africana major must complete 36 credits in courses offered by the center, to include the following four core courses: ASRC 2300, 2601, 2602, and 4501. Beyond the core courses, the student must take 8 credits of center courses numbered 2000 or above and 15 credits numbered 3000 or above. The program of an undergraduate major may have a specifically African American or African focus.

The Africana Minor

The center offers minors in Africana Studies. The center's director of undergraduate studies will assist students in the design and coordination of minor programs. For the minor the center will require that at least 16 credits be taken in Africana Studies courses, including ASRC 2602.

Double Majors

In the case of double majors, students undertake to carry the full load of stipulated requirements for a major in each of the two departments they have selected.

[Certificate in African Studies

Not available 2009-2010. In conjunction with the Institute for African Development, the Africana Studies and Research Center administers an undergraduate Certificate in African Studies program. The certificate is available to students in all of the undergraduate colleges at Cornell. Many of the courses in the program might be used to fulfill other course distribution requirements. By pursuing this certificate, students acquire an interdisciplinary understanding of Africa.]

Honors

The honors program offers students the opportunity to complete a library research thesis, a field project in conjunction with a report on the field experience, or a project or experiment designed by the student. The requirements for admission to the honors program for all students—regular majors, joint majors, and double majors—are a B– cumulative average in all courses and a B+ cumulative average in the center's courses. Each student accepted into the honors program will have an honors faculty committee consisting of the student's advisor and one additional faculty member, which is responsible for final evaluation of the student's work. The honors committee must approve the thesis or project before May 1 of the student's junior year. The completed thesis or project should be filed with the student's faculty committee by May 10 of the senior year.

Language Requirement

Courses in Swahili, Arabic, Yoruba, and Zulu may be used to satisfy the College of Arts and Sciences language requirement. In Swahili, successful completion of ASRC 2100 satisfies Option 1. For Yoruba, successful completion of ASRC 2103 satisfies Option 1. For Arabic, ASRC 2101 or ASRC 3101 satisfy Option 1. For Zulu, ASRC 2104 satisfies Option 1. ASRC majors are not required to take an African language, but the center recommends the study of an African language to complete the language requirement.

First-Year Writing Seminars

See John S. Knight Institute brochure for times, instructor, and descriptions.

ASRC 1100 Elementary Swahili I

Fall, winter, summer. 4 credits. Language lab times TBA. A. Nanji.

Beginner's Swahili. Part 1—Grammar for speaking, reading, and writing. Requires no knowledge of language. Swahili is spoken in the East and Central parts of Africa.

ASRC 1101 Elementary Swahili II

Spring, summer, winter. 4 credits.

Prerequisite: ASRC 1100. A. Nanji.

Continued study of the basic grammatical formation of the language and the introduction of reading material ranging from songs to short stories. A great many drills are used in this course to help develop the student's comprehension of the language. Swahili tapes are used during all of these sequences.

ASRC 1102 Intermediate Swahili I

Fall. 4 credits. Prerequisites: ASRC 1100 and 1101. A. Nanji.

Advanced study in reading and composition.

ASRC 1104/1105 Elementary Arabic I and II (also NES 1201/1202)

Fall, spring, summer. 4 credits. M. Younes. For description, see NES 1201/1202.

ASRC 1106/2101 Intermediate Arabic I and II (also NES 1203/2200)

Fall, spring, summer. 4 credits. ASRC 2101 @ satisfies Option 1. M. Younes.

For description, see NES 1203/2200.

ASRC 1108/1109 Introduction to Yoruba I and II

Fall/spring. 4 credits. A. Ademoyo.

A two-semester beginner's course in Yoruba Language and Culture. Organized to offer Yoruba language skills and proficiency in speaking, reading, listening, writing, and translation. Focus is placed on familiar informal and formal contexts, e.g., home, school, work, family, social situations, politics, etc. Course uses Yoruba oral literature, proverbs, rhetoric, songs, popular videos, and theatre, as learning tools for class comprehension. First semester focuses on conversation, speaking and listening. Second semester focuses on writing, translation and grammatical formation. Through the language course students gain basic background for the study of an African culture, arts, and history both in the continent and in the diaspora. Yoruba language is widely spoken along the west coast of Africa and in some African communities in diaspora. Yoruba video culture, theatre, music, and arts have strong influence along the west coast and in the diaspora.

ASRC 1110 Intermediate Yoruba I

Fall. 4 credits. Prerequisite: ASRC 1109.

A. Ademoyo.

The intermediate course extends the development of the main language skills, reading, writing, listening, and conversation. The course deepens the development of correct native pronunciation, the accuracy of grammatical and syntactic structures; and the idiomatic nuances of the language. Students who take the course are able to (i) prepare, illustrate and present Yoruba texts such as poems, folktales, advertisements, compositions, letters, (ii) read Yoruba literature of average complexity, (iii) interpret Yoruba visual texts of average difficulty, (iv) comprehend Yoruba oral literature and philosophy—within the context of African oral literature and philosophy—of basic complexity. Through the Yoruba language students appreciate African oral literature and philosophy. The primary textual media are Yoruba short stories, poems, short plays, films, songs, and newspapers.

ASRC 1114/1115 Elementary Zulu I and II

Fall, spring. 4 credits. S. Mkhonza.

Zulu, known by native speakers as IsiZulu, is one of the 11 official languages of South Africa. Out of the four Nguni languages (Zulu, Xhosa, Swati, and Ndebele), Zulu is the most widely spoken. The advantage of learning IsiZulu is that it forms the basis for understanding the other Nguni languages. This is a two-semester elementary course which introduces students to the basic structures of the language which are applied to rapidly develop the primary speaking, reading, and writing skills of the Zulus. The class will also explore traditional and contemporary cultures of the Zulu people.

ASRC 1116 Intermediate Zulu I

Spring. 4 credits. Prerequisite: ASRC 1115. S. Mkhonza.

The course will help students to expand their understanding of the Zulu language through the communicative approach. We will focus on the four skills, speaking, listening, reading and writing. Intermediate work focuses on reading and speaking spontaneously. We will introduce composing in Zulu more reading.

ASRC 1300 Africa: The Continent and Its People @ (HA-AS)

Fall. 3 credits. L. Edmondson.

Introductory interdisciplinary course focusing on Africa's geographical, ecological, and demographic characteristics; indigenous institutions and values; the triple cultural heritage of Africinity, Islam, and Western civilization; main historical developments and transitions; and contemporary political, economic, social, and cultural change. Africa's ties with the United States (from trans-Atlantic slavery to the present), its impact on the emerging world order, and its contribution to world civilization are also explored.

ASRC 1600 Black Families and the Socialization of Black Children (SBA-AS)

Fall. 3 credits. T. Gosa.

This course explores the historic and contemporary dynamics of the African American family in U.S. society. We will begin our work by focusing on the socio-historical, -political, and -cultural contexts of black family formations and functions in the African Diaspora. Students will be challenged to consider the continuation of African heritage in black family organization. We will review Afrocentric, feminist, and sociological frameworks for understanding black families. The course proceeds to consider more contemporary topics including gender roles, divorce and marriage dissolution, sexuality and love, mate selection, parenting and fatherhood, and the well-being of black children. We will pay special attention to how black families are (re)imagined in popular culture, including representations in the news, film and television, and music.

ASRC 1900 Research Strategies in Africana and Latino Studies (also LSP 1101)

Spring. 1 credit. E. Acree and T. Cosgrave. For description, see LSP 1101.

ASRC 2100 Swahili Literature @ (LA-AS)Spring. 4 credits. *Satisfies Option 1.*

Prerequisite: ASRC 1102. A. Nanji.

Students gain mastery over spoken Swahili and are introduced to the predominant Swahili literary forms.

ASRC 2103 Intermediate Yoruba II @Spring. 4 credits. *Satisfies Option 1.*

Prerequisite: ASRC 1110. A. Ademoyo.

The Intermediate Yoruba II is a follow-up to Intermediate Yoruba I. It is a fourth semester Yoruba Language course. The course assists students to acquire advanced level proficiency in reading, speaking, writing and listening in Yoruba language. Students are introduced to grammatical and syntactic structures in the language that will assist them in describing, presenting, and narrating information in the basic tenses. At the end of the course, students will be able to listen to, process and understand programs produced for native speakers in media such as television, radio, films etc. They will be able to read and understand short stories, novels, plays written for native speakers of the language.

ASRC 2106 Intro to Quranic Arabic (also NES/RELST 2204) @ (LA-AS)

Spring. 4 credits. M. Younes.

For description, see NES 2204.

ASRC 2300 African Cultures and Civilizations # @ (CA-AS)

Spring, summer. 3 credits. A. Bekerie.

Concerned with the peoples of Africa and the development of African cultures and civilizations from the earliest times to the present day. Focuses on the near modern civilizations of Africa south of the Sahara, and the ancient civilizations of Egypt and the Nile Valley, together with their contributions to the development of the major world civilizations. Also deals with the sociopolitical organization of African societies, their kinship systems, cross-cutting ties, rites of passage, gender relations, and arts (including music, dance, folklore, architecture, sculpture, painting, and body decoration).

ASRC 2304 African Encounters with Colon (also HIST 2540) @ (HA-AS)

Spring. 4 credits. D. Magaziner.

For description, see HIST 2540.

ASRC 2306 The Past and Present of Precolonial Africa (also HIST 2550) @ (HA-AS)

Spring. 4 credits. S. Greene.

For description, see HIST 2550.

ASRC 2307 The White Image in the Black Mind (also HIST 2412) @ (HA-AS)

Fall. 4 credits. S. Greene.

For description, see HIST 2412.

ASRC 2308 Caribbean History (also HIST 2308) (HA-AS)

Fall. 3 credits. J. Byfield.

This course provides an historical overview of the Caribbean beginning with a brief examination of indigenous society and the impact of European colonization. Most of our attention will focus on the development of the plantation economy, slavery, post-emancipation and post-colonial society. Readings pay particular attention to the ways in which race, gender, and ethnicity shape the histories of the peoples of the region. The course uses a pan-Caribbean approach by focusing on three islands—Cuba, Haiti, Jamaica—that belonged to competing empires. Although their histories are shaped in distinct ways by their former metropolises, they share certain common features. Therefore, we examine the differences and similarities of their histories as they evolved from plantation based colonies to independent nations.

ASRC 2309 Reading and Writing the African Diaspora (also HIST 2461) @ (HA-AS)

Spring. 4 credits. D. Magaziner.

For description, see HIST 2461.

ASRC 2505 Literature, Sports, and Ideology (also ENGL 2751) (LA-AS)

Fall. 3 credits. G. Farred.

This course will explore the relations amongst sport, literature, and ideology. Reading texts from a variety of genres, novels, "memoirs," social histories (that are also love letters to a particular team), and some forms that refuse easy categorization, this course seeks to understand the very distinct, and often hard to define exactly, that sport "performs" in literature. From Don DeLillo's *Underworld* to Eduardo Galeano's beautiful, cryptic contemplation on football (*Soccer in Sun and Shadow*) to CLR James' magisterial work on cricket (*Beyond a Boundary*), this course will engage writings on sport from all over the world. Sport, the premise is here, opens the reader up to the world in a way that no other literary pursuit does.

ASRC 2601 Afro-American Social and Political Thought (SBA-AS)

Spring. 3 credits. J. Turner.

This is an introductory course that reviews and analyzes the major theoretical and ideological formulations developed and espoused by African-Americans in the struggle for liberation. We focus specifically on the political philosophy and historical significance of Malcolm X, and the work and movement of Marcus Garvey, as the prime movers of nationalism and pan-Africanism among Black people in this century. Such themes as slave resistance, nationalism, Pan-Africanism, emigration, anti-imperialism, socialism and internal colonialism, and the political and social views of Black women are discussed. Black political thought is viewed in its development as responses to concrete conditions of oppression and expression.

ASRC 2602 The Sociology of the African-American Experience (SBA-AS)

Fall. 3 credits. J. Turner.

This is an introductory course to the field of Africana Studies. It assumes a historical/sociological approach to the examination of the African-American experience. The course surveys the African beginnings of humankind and the classical role of Black people in world civilization and the making of early culture. The course treats issues in the humanities, social sciences, and history. The course is required for all undergraduate students majoring at the Africana Center.

ASRC 3100/3101 Advanced Intermediate Arabic I and II (also NES 3201/3202) @Fall/spring. 4 credits. *ASRC 3100 satisfies Option 1.* M. Younes.

For description, see NES 3201/3202.

ASRC 3200 Politics of Global Africa (also ASRC 6200) @ (SBA-AS)

Fall. 4 credits. A. Mazruu.

This course will combine the study of Africa with the study of two Diasporas. The Diaspora of Enslavement concerns enslaved Africans and descendants of slaves in both the Western and Eastern Diaspora. The Diaspora of Colonization concerns demographic dispersal as a result of colonialism. African Americans are part of the Diaspora of Enslavement. Algerian immigrants into France are part of the Diaspora of Colonization. Jamaicans and Trinidadians in Briton are a double-Diaspora—products of both enslavement and colonialism. This course will also examine the debate about whether the African peoples are owed reparations by either the West of the Arabs or both. This course will address the following areas of comparative Black experience: the politics of race, gender, religion, liberation, language, civil rights and postcoloniality.

ASRC 3205 Thinking Black Intellectuals

Spring. 4 credits. G. Farred.

"Thinking Black Intellectuals" departs from the premise that there is always, in one form or another, a "crisis"—or, a question about the "role" of the intellectual. However, in the conception of this course, the intention is not to address this issue. Instead, the course seeks to "demonstrate" the act of, properly speaking, Black intellectual thinking. By reading a series of texts, from Black scholars in philosophy such as Valentin Mudimbe to the renowned African-American theologian and preacher, Gardner C. Taylor, from the artistic oeuvre of Fela Kuti to the interventionist work of Angela Davis, this course will engage the thought of Black intellectuals. What, the guiding question

will be, does it mean to think, specifically, or not, as a Black intellectual?

ASRC 3300 African History: Earliest Times to 1800 @# (HA-AS)

Fall. 3 credits. *May be used for history requirement; satisfies geographical and historical breadth requirement.*

A. Bekerie.

As the second largest continent with vast and varying geographical and sociocultural conditions combined with recently established fact as an original home of human species, Africa provides a rich and diverse oral and written early history. The course covers some of the major historical signposts from the origins of human species to 1800. Among the topics for discussion are: Physical and Economic Geography of Africa, the Cradle of Humankind, the Peopling of Africa, Historical Perspectives and Sources, the Nile River Cultural Complex, Berber, Carthage and Maghreb of North Africa, Upper Guinea and Western Sudan of West Africa, cities of the East African Coast, and Great Zimbabwe and other sites of Southern Africa.

ASRC 3302 West Africa and West: 1450-1850 (also HIST 3650) @ # (HA-AS)

Fall. 3 credits. S. Greene.

For description, see HIST 3650.

ASRC 3303 History and Popular Culture in Africa (also ARTH/HIST 3303)

Spring. 4 credits. J. Byfield.

Although African societies are often presented as suspended in "traditional" culture, visitors to the continent are acutely aware of the dynamic popular culture that exists. This course uses a multidisciplinary approach to explore the complex relationship between history and popular culture in several African countries. Examining old as well as new forms of popular culture, we will explore the ways in which artists, writers, filmmakers, and musicians use moments of great historical significance or key historical actors as a point of departure for critique and reflection on the present. Examples will be taken from eastern, western, and southern Africa.

ASRC 3304 African American History: B. T. Washington to B. Obama

Spring. 4 credits. R. Harris, Jr.

This course will examine the changing contours of the African American past from the post-Reconstruction period to the present. W.E.B. Du Bois in *The Souls of Black Folk* evoked the need to study Black America from the inside out and in relation to the trajectory of American history. This course will seek to understand the challenges, triumphs and tragedies, of African Americans in the quest for racial equality in the United States. It will consider, against the backdrop of the past, the extent to which the election of a Black President of the United States has signaled the end of Black history and the arrival of a post-racial America.

ASRC 3500 African American Art (also ARTH 3500) (LA-AS)

Fall. 3 credits. C. Finley.

For description, see ARTH 3500.

[ASRC 3510 Caribbean Literature (also ENGL/FGSS 3510) (LA-AS)]

Fall. 4 credits. Next offered 2010-2011.

C. Boyce Davies.

This course examines representative literature of the Caribbean, including work by Caribbean women writers. We will examine the writings of Caribbean communities abroad

as we broaden the meanings of what is Caribbean. Traditional and contemporary oral/folk/urban forms of creative expression and film expression will be features of our ongoing analysis. We will pursue some of the themes that have been current in Caribbean literature and the particular relationships of Caribbean literature to the construction of American and/or English literatures and the definitions of Caribbeaness. Our sub-theme focuses on the discourses of migration that have garnered substantial attention in recent years and is a fundamental feature of the construction of Caribbean identities and literatures.]

ASRC 3604 U.S. Education, Oppression, Resistance

Spring. 4 credits. T. Gosa.

Despite salient reductions in educational inequality over the past 30 years, the academic underachievement of Black, Latino/a, and Native American youth remains one of the most researched, yet stubborn social problems in American society. The goal of this course is to explore issues of race and ethnicity in American education. Students will be asked to consider the ways in which schools foster poor academic performance and devalue minority youth's cultural and ethnic identities. Topics include school and residential segregation, academic tracking, language isolation, teacher quality, pedagogy and curriculum, and family/peer group influences. We will pay special attention to how students resist unfair schooling conditions and persist against the odds. The course will conclude with the limits and possibilities for school reform.

[ASRC 4200 Afrocentricity: Paradigm and Critical Readings @ (CA-AS)]

Fall. 4 credits. Next offered 2010-2011.

A. Bekerie.

What is Afrocentricity? It is a theoretical framework designed to study and interpret the histories and cultures of peoples of Africa and African descent by locating them at the center of their experiences. In other words, it is a method of knowing the life experiences of African peoples from the inside out. The course examines—through the writings of Asante, Keto, Clarke, Jean, Myers, Amin, Mazrui, Gates, Appiah, Richards, Schlesinger, and Thiongo—the conception and depth of the paradigm, its relevance in the production and utilization of knowledge, particularly emancipatory knowledge, the history of the paradigm, and the debate it generates among a wide range of thinkers and scholars.]

ASRC 4201 Islam in Africa and Its Diaspora (also ASRC 6206, DSOC 4360/6630, NES 4501) (CA-AS)

Spring. 4 credits. A. Mazrui.

It has been estimated that one-third of the Muslim population of the world is in Africa and the African Diaspora. This course addresses the historical dimension of Islam in the Black experience examining Global Africa as a whole. Within the African continent, Islam is part of the triple religious heritage, which includes rivalry with Christianity and co-existence with African indigenous religions. In the Americas, Islam is up against Western secularism and Christianity. We are concerned with how Islam has affected the politics and cultures of the African peoples worldwide, issue of slavery and Islam, and the interaction between Islam and contemporary ideologies of socialism, nationalism and race consciousness in the Black experience.

ASRC 4300 African American Politics (also ASRC 6301) (HA-AS)

Fall. 4 credits. J. Turner.

The central thesis of African-American politics has been its movements for political change and democratic access and human rights. This development since the 17th century is a complex political legacy. This course conducts a close study of African-American political practice and theoretical analysis of the American political system. Implications of the political systems for prospects and limitations to participation by Black people are analyzed. Critical historical stages in the process of Black politics are examined. The development of electoral offices in federal and statewide politics in critical industrial centers, as well as rural hamlets, center the course. Presidential politics—the Jesse Jackson campaigns—and new political formations including Black Republicans/conservatives constitute the emphasis on contemporary events. The course reviews the development of the literature in African-American politics.

ASRC 4301 African American History: Black Leaders and Movements

Spring. 4 credits. R. Harris, Jr.

From rebellions aboard slave ships through the quest for black self-determination, African Americans have sought to define freedom, justice, and equality for themselves and in the process have challenged the universality of the American Creed. This course will examine the dynamics of leadership, types of leaders, and the major movements that have emerged among African Americans from the early 17th century to the present. The relationship between leaders and followers, balance between ends and means, and measures of success and failure will be major concerns of the course.

ASRC 4302 Nile Valley Civilization: Ethiopia, Nubia, and Egypt @ (HA-AS)

Spring. 4 credits. A. Bekerie.

Focuses on Nile Valley civilizations and their contributions to African and world history. Since natural and human resources provide the foundation for civilizations, the course also examines the ecological and cultural compositions of the river. Concentrates on the Aksumite civilization of Ethiopia, Nubian civilizations of the Sudan, and the Kemetic civilizations of Egypt. Uses archaeological, literary, oral, biological, and religious sources to study civilization centers along the Nile. Students discuss civilizations as artifacts that have material, spiritual, social, and philosophical dimensions. Students are introduced to the Ethiopic writing system as a practical lesson in the conception and understanding of aspects of African civilizations.

ASRC 4305 African Environmental History (also HIST 4271) @ (HA-AS)

Fall. 4 credits. D. Magaziner.

For description, see HIST 4271.

ASRC 4306 To Be Enslaved Then and Now (also HIST 4421) # (HA-AS)

Spring. 4 credits. S. Greene.

For description, see HIST 4421.

ASRC 4502 African Cinema (also ARTH 4578) @ (LA-AS)

Fall. 4 credits. S. Hassan.

This course offers an overview of African cinema and filmmaking. It surveys historically the evolution of African cinema from its early days to the present. Through screening of

selected African films, different trends within African cinema will be explored, such as "Return to the Sources" and the rediscovery of the pre-colonial past; the "Social Realist" narrative and critique of post-independence Africa; reconstructing the story of colonialism from the perspective of the colonized; and the entertainment genre. Techniques, styles, and aesthetics of African cinema will also be discussed. The course offers a unique opportunity of looking at African culture and society, and at issues of social change, gender, class, tradition, and modernization through African eyes.

[ASRC 4504 Exhibiting Cultures (also ARTH 4508) (CA-AS)]

Fall. 4 credits. Next offered 2010–2011. C. Finley.]

ASRC 4508 The Harlem Renaissance (also ENGL 4508) (LA-AS)

Fall. 4 credits. R. Richardson.

In this course, we will examine the Harlem Renaissance, including works by James Weldon Johnson, Jean Toomer, Nella Larsen, Langston Hughes, Countee Cullen, George Schuyler, Wallace Thurman, and Zora Neale Hurston. The Harlem Renaissance occurred during the 1920s in the wake of the Great Migration to the urban North. It encompassed a range of other art forms and media beyond literature, such as painting, photography, and music and coincided with the "Jazz Age." We will consider the rise of Josephine Baker as a phenomenon in Paris. We will consider overlapping literary movements that also shaped the Harlem Renaissance profoundly, from modernism to Negritude (i.e., in France and the Caribbean). Additionally, we will explore the work of noted photographers, artists and musicians of the period.

ASRC 4509 Toni Morrison's Novels (also ASRC 6513, ENGL 4509)

Spring. 4 credits. R. Richardson.

The course will focus on reading novels by Toni Morrison, including *The Bluest Eye*, *Sula* (1973), *Song of Solomon* (1977), *Beloved* (1987), *Jazz* (1992), *Paradise* (1998), *Love* (2003), and *A Mercy* (2008). The presentation of her novels in trilogy form and her contributions to the genre of historical writing will be given some consideration. We will explore the author's stylistic innovation and expansion of this genre. We will consider topics such as how to read novels critically. We will pursue our study with attention to major public works of Morrison, from her art project as a curator at the Louvre to the Toni Morrison Society's "Bench by the Road" project and its 2008 conference in Charleston, South Carolina and upcoming Paris meeting in summer 2010.

ASRC 4600 Politics and Social Change in the Caribbean @ (SBA-AS)

Fall. 4 credits. L. Edmondson.

Study of the historical, geostrategic, political, economic, and social (including racial and cultural) forces affecting the domestic and international experiences of Caribbean societies.

[ASRC 4601 Education Innovation in Africa and the Diaspora (also EDUC 4590) @ (SBA-AS)]

Fall. 4 credits. Next offered 2010–2011. N. Assié-Lumumba.

This course deals with educational innovations geared to promoting equal opportunity based on gender, race and class, in Africa and the African Diaspora.]

ASRC 4602 Women and Gender Issues in Africa @ (SBA-AS)

Spring. 4 credits. N. Assié-Lumumba.

There are two contrasting views of the status and role of women in Africa. One view portrays African women as dominated and exploited by men. According to another view women have a favorable social position in Africa; indigenous ideologies consider women to be the foundation of society, they are economically active and independent and they have an identity independent of men. In this seminar we discuss the status and role of women in Africa historically as well as in the contemporary period. Topics include women in nonwesternized/precolonial societies; the impact of colonial policies on the status of women; gender and access to schooling, participation in the economy and politics; women and the law; women and health issues; gender issues in southern Africa; womanism and feminism; the United Nations Decade of Women; and the four World Conferences on Women (Mexico 1975, Copenhagen 1986, Nairobi 1985, and Beijing 1995).

ASRC 4603 Politics and Social Change in Southern Africa @ (SBA-AS)

Spring. 4 credits. L. Edmondson.

Focuses on the legacies of apartheid and the challenges of transformation toward a post-apartheid society in South Africa. Topics include the rise and decline of apartheid; the historical continuity of Black resistance against racism; women under, against, and after apartheid; South Africa's relations with its neighbors; geo-political, economic, and racial dimensions of the American connection; politics of negotiation and transition to majority rule; prospects for stability, democracy, and equality; and South Africa's new role in the African continental and global arenas. Instructor's lectures are supplemented by films and class discussions.

ASRC 4605 Public Policy and the African-American Urban Community (SBA-AS)

Spring. 4 credits. J. Turner.

The socioeconomic conditions of the African-American urban community are the central focus of the course. Community development models are explored in relationship to the social needs of the African-American population. The changing configuration of internal organization of the African American community nationally is examined.

[ASRC 4606 The Family and Society In Africa (also SOC 4780) @ (SBA-AS)]

Fall, summer. 4 credits. Next offered 2010–2011. N. Assié-Lumumba.

Concepts of the nuclear and extended family, the roles, rights and obligations of different age groups and generations; and marriage and its related issues.]

ASRC 4607 African Port Cities: Empire Building at the Crossroads (also ARTH/SHUM 4825)

Fall. 4 credits. P. Meier.

For description, see SHUM 4825.

ASRC 4900–4901 Honors Thesis

4900, fall; 4901, spring. Prerequisite: permission of ASRC director of undergraduate studies. Africana Center faculty.

For senior Africana Studies majors working on honors theses, with selected reading, research projects, etc., under the supervision of a

member of the Africana Studies and Research Center faculty.

ASRC 4902–4903 Independent Study

4902, fall; 4903, spring. Africana Studies faculty.

For students working on special topics, with selected reading, research projects, etc., under the supervision of a member of the Africana Studies and Research Center faculty.

ASRC 4933 Abolitionist Circuits (also ENGL 4073, HIST/SHUM 4933)

Spring. 4 credits. M. Schoolman.

For description, see SHUM 4933.

ASRC 6200 Politics of Global Africa (also ASRC 3200)

Fall. 4 credits. A. Mazrui.

For description, see ASRC 3200.

ASRC 6206 Islam in Africa and Its Diaspora (also ASRC 4201, DSOC 4360/6630, NES 6710)

Spring. 4 credits. A. Mazrui.

For description, see ASRC 4201.

ASRC 6207 Black Feminist Theories (also ENGL/FGSS 6207, COML 6465)

Fall. 4 credits. C. Boyce Davies.

This course examines black feminist theories, paying particular emphasis on the cross-cultural experiences of women as expressed both theoretically and creatively. It follows the chronologies and variations of modern black feminisms, beginning with the U.S. articulations and moving toward how particular feminist positions are constructed and theorized in other locations across the African diaspora such as Black British feminism, Caribbean feminism, African feminism. Thus we will explore the various theories and texts within their sociopolitical and geographical frames and locations, analyzing these as appropriate against or in relation to a range of feminist activism and movements.

ASRC 6301 African American Politics (also ASRC 4300)

Fall. 4 credits. J. Turner.

For description, see ASRC 4300.

ASRC 6304 Marriage and Divorce in the African Context (also FGSS 6304)

Fall. 4 credits. J. Byfield.

Marriage was the widely expected norm within African societies. The institution was an important marker of adulthood, linking individuals and lineages in a network of mutual cooperation and support. Marriage practices and their concomitant gender expectations varied significantly between societies, and over time. As a result, marriage and divorce are especially rich terrain for exploring social history, women's agency, discursive constructions of "woman," masculinity, and gender relations of power. This course explores some of the newest scholarship on marriage by Africanist scholars. The readings demonstrate the wide cultural variety in marriage as well as the dynamic relationship between marriage and historical change. They especially highlight women's roles and expectations in marriage, masculinity and the ways men and women negotiated the rules and boundaries of marriage.

ASRC 6305 Dress, Cloth, and Identity: Africa and the Diaspora (also ARTH 6305)

Spring. 4 credits. J. Byfield.

This course uses a multidisciplinary approach to examine the importance of textiles in African social and economic history. It combines art history, anthropology, social and economic history to explore the role of textiles in marking status, gender, political authority and ethnicity. In addition, we examine the production and distribution of indigenous cloth and the consequences of colonial rule on African textile industries. Our analysis also considers the principles of African dress and clothing that shaped the African diaspora in the Americas as well as the more recent popularity and use of African fabrics and dress in the United States.

ASRC 6400 Africana Thought (also ENGL 6401)

Fall. 4 credits. G. Farred.

What kind of thinking is being and has been produced, historically by figures in Africana philosophy? Intention of course is not—though that may a collateral effect—to argue against those who naysay the existence of Africana philosophy nor is it to “define” the field, as if such a project were even possible. “Africana Thought” will, instead, seek to engage those thinkers who produce this philosophy. The readings will run from the “Confessions” of St. Augustine through Alexander Crummell’s musings to Valentin Mudimbe’s “The Invention of Africa,” from intense reflections on the condition of black subjugation that is Frantz Fanon’s writing to locating Jacques Derrida as a philosopher of the Maghreb. Course about Africana philosophy as a project that persistently questions itself.

ASRC 6401 The Politics of Theory (also ENGL 6402, FREN 6401)

Spring. 4 credits. G. Farred.

There is an old and hoary chestnut that pits theory against politics, presuming, arguing, that theory is not, has no, politics. This course is not designed to either rebut or ignore that antagonism. Instead, the intent here is simply to read a range of theorists, from John Stuart Mill (“On Liberty”) to Alain Badiou, to think how the politics of theory and the theory of politics. Badiou, Mill, Carl Schmitt and Jacques Ranciere, never shy away from their sense of the political. If anything, this course will delight in how unreflectively these thinkers take the matter of politics. In fact, and here Schmitt is crucial, at issue will be: how could we not think our politics theoretically?

ASRC 6506 African Aesthetics (also ARTH 5571)

Spring. 4 credits. S. Hassan.

The goal of this course is to investigate in depth the principles of aesthetics and philosophy of African visual arts. The course offers a critical survey of the different writings and the growing body of research on this relatively new area of inquiry. The objectives of the course are to review how African aesthetics have been studied to date, to provide a critical analysis of the different approaches to the subject and related issues, and to suggest future directions of research. In-depth analysis of particular African societies is used to examine the relationship of arts and aesthetics to indigenous concept of time, space, color, form, and sociopolitical order. In addition, issues related to African aesthetics and arts such as style, gender, class, and social change are also explored.

ASRC 6513 Toni Morrison’s Novels (also ASRC 4509)

Spring. 4 credits. R. Richardson.

For description, see ASRC 4509.

ASRC 6600 Education and Development in Africa

Spring. 4 credits. N. Assié-Lumumba.

Human capital theory establishes a positive and linear relationship between formal education and individual productivity and socioeconomic attainment and economic growth and development of nations. While enjoying considerable popularity in industrial and developing countries, including African countries, education has also been perceived as a hindrance to development. The concept of human capital and paradigms of development including modernization, dependency, and Third World Forum are first introduced. Specific issues discussed include schooling and nonformal education; the role of primary, secondary, and higher education in development; and language, access, output, and outcome based on social class, ethnicity, race, and gender. Employment, migration and international brain drain, the information and communication technologies, indigenous knowledge systems, and the role of higher education in regional and international cooperation are also examined.

ASRC 6606 Politics of the Hip-Hop Generation

Spring. 4 credits. T. Gosa.

This graduate seminar investigates the political dynamics of the hip-hop generation. The primary focus of this course will be the major political and economic forces that have shaped the worldview of Black and Latino/a youth born between 1965 and 1984. Students will critically address major topics surrounding hip-hop including race-ethnicity, gender and sexuality, social class, segregation/mass-incarceration, politics, and education. After reviewing the socio-historical development of hip-hop, we will examine the role of hip-hop in modern black politics and activism, including its significance for mobilizing youth. Special attention will be given to the generational gap between the hip-hop generations and the Civil-Rights/Black Power parents.

ASRC 6900-6901 Independent Study

6900, fall; 6901, spring. Variable credit.

Prerequisite: graduate standing. Africana Studies faculty.

ASRC 6902-6903 Africana Studies Graduate Seminar

6902, fall; 6903, spring. 4 credits. Africana Studies faculty.

Designed for first-year ASRC graduate students. The seminar is coordinated and supervised by one professor but team-taught by three or four faculty members per semester. Each participating faculty member is responsible for a topical segment of the course related to her or his areas of specialization or an area of interest pertaining to theory and methodology of Africana Studies.

ASRC 8900-8901 Thesis

8900, fall; 8901, spring. Prerequisite: ASRC graduate students. Africana Studies faculty.

AMERICAN STUDIES

M. C. Garcia, acting director; G. Altschuler, E. Baptist, R. Bensel, M. P. Brady, D. Chang, E. Cheyfitz, J. Cowie, J. Frank, J. E. Gainer, M. C. Garcia, F. Gleach, S. Haenni, A. Hammer, R. Harris, M. Jones-Correa, K. Jordan, K. Kassam, M. Katzenstein, J. Kirschner, R. Kline, I. Krannick, C. Lai, F. Logevall, T. J. Lowi, B. Maxwell, K. McCullough, L. L. Meixner, R. Mize, R. L. Moore, V. Nee, M. B. Norton, J. Parmenter, R. Polenberg, S. Pond, A. Sachs, N. Salvatore, S. Samuels, M. E. Sanders, V. Santiago-Irizarry, M. Shefter, A. M. Smith, S. Villenas, M. Washington, S. Wong, M. Woods, D. Woubshet. Affiliated faculty: J. E. Bernstock, M. Hatch, J. Jennings, J. Peraino, P. Sawyer. Emeritus: S. Blumin, J. Brumberg, M. Kammen, D. E. McCall, J. Silbey

The Major

The major in American Studies, appropriate for a wide array of future professions, began as a program of coordinated study in the history, literature, and politics of the United States. These remain the core elements, but American Studies aims to be inclusive in its subject matter. Given the nation’s diverse population and cultures, the program wants its majors to examine American experience in broad terms, drawing on the materials and methods of a variety of disciplines.

Students who contemplate becoming American Studies majors are encouraged to speak with the program director as early as possible to arrange for a major advisor.

All students majoring in American Studies must take a minimum of 12 courses selected from the American Studies roster, completing them with a grade of C or better. No more than six of these courses can come from any one discipline. Of the 12 courses at least three must have a substantial focus on material before 1900, at least two must deal with American diversity (AMST 1109 and 1110 are especially recommended), and at least one must be a 4000-level seminar, either one of the American Studies 4300 course range (4300-4399) or an appropriate substitute seminar at the 4000 level (AMST 4997/4998, taught in Washington, D.C., does not fulfill the seminar requirement though it counts as one course toward the major). Note: A single course may satisfy more than one of these requirements: e.g., a course on Native Americans in the 1800s is both a course dealing substantially with pre-1900 material and one dealing with American diversity.

Although a good bit of freedom is encouraged in the selection of courses, American Studies majors, in consultation with their advisor, must define an area of concentration and complete six courses in that area. The area of concentration can be designed to fit the particular interests of a student, but it must include subjects in at least two disciplines. Possible areas of concentration include “visual studies,” “cultural studies,” “race and ethnicity,” “legal and Constitutional studies,” “American institutions,” “class and social structure,” “the American environment.” (Courses taken to satisfy the concentration may be used to fulfill other requirements for the major.)

Students may find courses relevant to American experience that they wish to take but that are not on the American Studies course list. With their advisor’s approval,

students may count two such courses toward fulfilling the major.

Honors

Candidates for honors must maintain an average of B+ in courses pertinent to the major and have taken at least one course in which they wrote a research paper. Normally, at the end of the junior year students who wish to write a senior honors essay must approach a member of the American Studies faculty and discuss their ideas for a project. With approval from the faculty member students may then register in the fall of their senior year for AMST 4993, the honors essay tutorial. At the end of the fall semester, honors candidates meet with their advisor and a second member of the American Studies faculty to discuss their progress. If satisfactory, honors students complete their honors essays in the spring by enrolling in AMST 4994.

Category Key: Courses in American Studies are broken into different categories. To determine which category (ies) a course falls in, please note the reference at the end of each course description. The key is as follows: ASE = Anthropology, Sociology, and Economics, LT = Literature and Theatre Arts, GP = Government and Public Policy, HI = History, MV = Music and Visual Studies, HR = Honors, Reading and Research.

American Studies 4300 Seminars

AMST 4300 The Milman Seminar

Fall. 4 credits. Prerequisite: permission of instructor. G. C. Altschuler.

The Milman Seminar: Baseball in American Culture. Through a reading of fiction and nonfiction, we examine the role of baseball as it has shaped and reflected the attitudes and values of Americans. Novels assigned in the course include Bernard Malamud, *The Natural*; Mark Harris, *Bang the Drums Slowly*; Philip Roth, *The Great American Novel*; and Robert Coover, *The Universal Baseball Association*. Nonfiction works may include Neil Lanctot, *Negro League Baseball*, Roger Kahn, *The Boys of Summer*, and Andrew Zimbalist, *Baseball and Billions*. Each student in the course writes a 25- to 35-page research paper. (HI)

AMST 4301 The Rabinor Seminar (also ENGL 4301)

Spring. 4 credits. Prerequisite: permission of instructor. M. P. Brady.

The Rabinor Seminar explores the role of diversity in the formation of a distinct American tapestry. The specific topic varies each year, but the general subject is the promise and experience of pluralism. Topic for spring 2010: Queering Latinidad. This course will examine queer Latina and Latino literature, film, and art. Beginning with John Rechy's stunning novel about sex work, *City of Dreams*, and continuing with the theoretical and literary transformations wrought by Cherrie Moraga and Gloria Anzaldúa, this course explores the relationship between sex, desire, revolution, and belonging in the work of Luz Marie Umpierre, Rafael Campos, Luis Alfaro, Marga Gomez, Laura Aguilar, Frances Negron-Mutaner, and many others. We will also take up the theoretical terrain outlined by Jose Munoz, Maja Horn, and Yvonne Yarbro-Bejaranno. This course will entail extensive reading and two longer papers. (LT)

AMST 4303 Literature as History: The Americas (also ENGL 4303)

Fall. 4 credits. B. Maxwell.

Beginning with William Carlos Williams's *In the American Grain* (1925), this course will consider modernist innovations in the telling of history by literary means. Responding to what they felt as the "deadness" of conventional historiography, writers such as Williams, Charles Reznikoff, John Sanford, Muriel Rukeyser, Melvin Tolson, and Paul Metcalf produced imaginative American histories that made a new world of historical narration, and in the process found new objects of historical attention, one of which was the plural, transnational America of the hemispheric Americas. This reconfiguration anticipated and in some cases shaped recent revisionist critiques of the European presence on American soil (Eduardo Galeano, Leslie Marmon Silko, David Stannard, Ward Churchill, Noam Chomsky, Ana Castillo); accordingly, students will read examples, some polemical, of that later work. (LT)

AMST 4306 Topics in American Studies (also ARTH/VISST 4761)

Fall and spring. 4 credits. Prerequisite: permission of instructor. Not open to freshmen. L. L. Meixner.

Topic for Fall 2009: Public art and popular entertainments as the means for everyday people to politically engage or escape the Great Depression (1929–41). Discussions include Living Newspapers, the Federal Theater Project, Union-sponsored theater including Pins and Needles, WPA muralists and printmakers, FSA photographers, Social Realists including Ben Shahn, Reginald Marsh, and Philip Evergood, alongside Grant Wood and the Regionalists. Connecting these is FDR's New Deal and its controversial government support for the arts. We consider Big Bands and swing, pulp and comic strips, star tabloids, Depression-era Hollywood gangster films, "screwball" comedies, and Fred Astaire and Ginger Rogers spectacles. Will examine the importance of early radio in the home through FDR's fireside chats, soap operas, and serial thrillers such as the *Shadow*. Students will draw on the American Memory Project, documentaries, and the Johnson Art Museum collections. Films include *It Happened One Night*, *Gay Divorcee*, *Double Indemnity*, and Woody Allen's *Radio Days*. (MV)

Topic for spring 2010: American Art and the Machine. Seminar examines early modernism in America with emphases on the machine, mechanical reproduction, and the moving image including film and television. Machine is defined in broad terms to mean the artist, city, camera, department store, and consumer by-products including pictorial monthlies such as *Life*, fan magazines, fashion magazines, and comic books. Themes include the comic body in silent film; photography and social surveillance; early cinema and working-class women; the Great Depression and Broadway theatre; Depression-era "screwball comedies"; women and urban consumption; comic books and censorship; the construction of gender and the "American family" in early TV sitcoms including *Leave it to Beaver* and *Father Knows Best*; TV ads and the American homemaker; and 1940s "women's films." Artists include the Ashcan School, Hine, Lange, Evans, and Charlie Chaplin, Alfred Hitchcock, and Bette Davis. Films include *Modern Times*, *Rear Window*, *Dark Victory*, and *Sorry, Wrong Number*. (MV)

[AMST 4310 Topics in American Studies: American Politics and Dissent, 1945 to 2000 (also HIST 4311)]

4 credits. Permission of instructor required. Next offered 2011–2012. N. Salvatore.

This course will examine the Civil Rights movement, anti-Vietnam protests, a revitalized conservative politics, and the re-emergence of an evangelical presence in American politics, with particular focus on the electoral process after 1964. A series of papers, and a term paper are required. (HI)

AMST 4390 Reconstruction and the New South (also HIST 4390/6391) # (HA-AS)

Fall. 4 credits. M. Washington.

This course focuses on the American South in the 19th century as it made the transition from Reconstruction to new forms of social organization and patterns of race relations. Reconstruction will be considered from a sociopolitical perspective, concentrating on the experiences of the freed people. The New South emphasis will include topics on labor relations, economic and political changes, new cultural alliances, the rise of agrarianism, and legalization of Jim Crow. (HI)

Courses

AMST 1101 Introduction to American Studies # (CA-AS)

Spring. 4 credits. B. Maxwell.

This course is an introduction to interdisciplinary considerations of American culture. We will reflect on topics ranging from Native American relations to the land, to the European conquest of the Americas, to the development of American civic life and political culture and the ongoing African American struggle for freedom and equality. We will also study immigration as a (threatened) constant in national life and labor, the distinctions between mass culture and popular culture, the promise of American life, and violence as a persisting national woe. We'll examine these themes through literature, historical writing, music, art, film, architecture, and political economy in the United States. The course will also give attention to the many methods through which scholars have, over time, developed the discipline of American Studies, and to ongoing debates over the intellectual and political stakes of those methods. (LT)

[AMST 1109 Introduction to American Studies: New Approaches to Understanding American Diversity, the 19th Century # (HA-AS)]

4 credits. Next offered 2010–2011. N. Salvatore. (HI)

[AMST 1110 Introduction to American Studies: New Approaches to Understanding American Diversity, the 20th Century (HA-AS)]

4 credits. Next offered 2010–2011. M. C. Garcia and D. Chang. (HI)

AMST 1240 Democracy and Its Discontents: Political Traditions in the United States (also HIST 1240) (HA-AS)

Summer. 3 credits. N. Salvatore.

An examination of democracy and its critics. The course explores the evolution of democracy in America, focusing on some of the dramatic and important episodes in American history. It considers the struggles over the emancipation of slaves in the 19th

century and expanded rights for women and working people in the 20th century, free-speech issues, the civil-rights movement, religious-based critiques of American culture, and conservative critiques of American liberalism. The course serves as an investigation of the ways in which political expression takes forms in modern American culture. In addition to lectures, the course features several afternoon programs that include guest lecturers and hands-on instruction in how to use the modern electronic research library. (HI)

[AMST 1311 Popular Music in America: A Historical Survey (also MUSIC 1311) # (LA-AS)]

3 credits. Next offered 2011-2012. S. Pond. For description, see MUSIC 1311. (MV)

AMST 1312 History of Rock Music (also MUSIC 1312) (LA-AS)

Spring. 3 credits. J. Peraino. For description, see MUSIC 1312. (MV)

AMST 1313 A Survey of Jazz (also MUSIC 1313) (LA-AS)

Fall. 3 credits. S. Pond. For description, see MUSIC 1313. (MV)

AMST 1530 Introduction to American History (also HIST 1530) # (HA-AS)

Fall. 4 credits. M. B. Norton. For description, see HIST 1530. (HI)

AMST 1531 Introduction to American History: 1865-Present (also HIST 1531) (HA-AS)

Spring. 4 credits. A. Sachs. For description, see HIST 1531. (HI)

AMST 1600 Introduction to American Indian Studies I (also AIS 1100) (HA-AS)

Fall. 3 credits. P. Nadasdy. For description, see AIS 1100. (HI)

AMST 1601 Introduction to American Indian Studies II (also AIS 1110) (CA-AS)

Spring. 4 credits. K. Kassam. For description, see AIS 1110. (HI)

[AMST 2010 Popular Culture in the United States, 1900 to 1945 (HA-AS)]

4 credits. Next offered 2010-2011. G. Altschuler.

AMST 2010 deals with American popular culture in the period between 1900 and the end of World War II. As we examine best-sellers, films, sports and television, radio, ads, newspapers, magazines, and music, the goal is to better understand the ways in which popular culture as "contested terrain," the place where social classes, racial and ethnic groups, women and men, the powerful and the less powerful, seek to "control" images and themes. Topics include: the Western; Cultural Heroes and the Cult of Individualism in the 1920s; The Hays Code and the Black Sox scandal; Mae West and the "New Women"; Advertising in an Age of Consumption; Gangsters and G-Men; and Jackie Robinson and the American Dilemma. (HI)

[AMST 2020 Popular Culture in the United States, 1950 to Present (HA-AS)]

4 credits. Next offered 2010-2011. G. Altschuler.

AMST 2020 treats the period from 1950 to the present as we examine best-sellers, films, sports and television, radio, ads, newspapers, magazines, and music. We try to better understand the ways in which popular culture

shapes and/or reflects American values. The course also depicts popular culture as "contested terrain," the place where social classes, racial and ethnic groups, women and men, the powerful and less powerful, seek to "control" images and themes. Topics include: *The Honeymooners* and 1950s television, soap operas; "gross-out" movies; Elvis; the Beatles and Guns 'n Roses; gothic romances; and *People Magazine* and *USA Today*.]

AMST 2022 The Court, Crime, and the Constitution (also HIST 2020) (HA-AS)

Fall. 4 credits. R. Polenber. For description, see HIST 2020. (HI)

AMST 2030 Introduction to American Literature (also ENGL 2030) # (LA-AS)

Fall. 4 credits. L. Donaldson. For description, see ENGL 2030. (LT)

[AMST 2033 Wilderness in North American History and Culture (also HIST 2030) # (HA-AS)]

4 credits. Next offered 2010-2011. A. Sachs. For description, see HIST 2030. (HI)

AMST 2040 Introduction to American Literature (also ENGL 2040) (LA-AS)

Spring. 4 credits. J. Braddock. For description, see ENGL 2040. (LT)

AMST 2060 The Great American Cornell Novel (also ENGL 2060) (LA-AS)

Spring. 4 credits. M. Hite. For description, see ENGL 2060. (LT)

[AMST 2090 Seminar in Early America (also FGSS/HIST 2090) # (HA-AS)]

4 credits. Limited to 20 students. Next offered 2010-2011. M. B. Norton. (HI)

AMST 2100 Progressive Reform in America, 1900-1940

Fall. 4 credits. Limited to 15 students. Priority given to sophomores. N. Salvatore. This course looks at progressive reform from the early 20th century to the edge of World War II. We will look at politics, the impact of world war, contesting ideologies, the role of the corporation, and the evolving meaning of liberalism through a variety of movements and individuals. Short essays and a research paper required. (HI)

[AMST 2105 The American Musical (also ENGL/THETR 2150, MUSIC 2250) (LA-AS)]

3 credits. Next offered 2010-2011. N. Salvato. For description, see THETR 2150. (MV)

[AMST 2110 Black Religious Traditions: Sacred and Secular (also HIST/RELST 2110) (HA-AS)]

Spring. 4 credits. Next offered 2010-2011. M. Washington.]

[AMST 2120 African American Women: 20th Century (also FGSS/HIST 2120) (HA-AS)]

4 credits. Next offered 2010-2011. M. Washington. (HI)

[AMST 2150 Comparative American Literature (also COML 2150) (LA-AS)]

Fall. 4 credits. Next offered 2011-2012. B. Maxwell.]

[AMST 2200 Travel in American History and Culture (also HIST 2200) (HA-AS)]

4 credits. Next offered 2010-2011. A. Sachs. (HI)

[AMST 2211 Seminar: The Blues and American Culture (also HIST 2211) (HA-AS)]

4 credits. Next offered 2010-2011. R. Polenber. (HI)

[AMST 2250 The U.S.-Mexico Border: History, Culture, Representation (also HIST/LSP 2250) (CA-AS)]

4 credits. Next offered 2010-2011. M. C. Garcia.]

[AMST 2300 Latino Communities (also DSOC/LSP 2300) (SBA-AS)]

3 credits. Next offered 2011-2012. R. Mize. For description, see DSOC 2300. (ASE)]

AMST 2350 Archaeology of North American Indians (also AIS 2350, ANTHR/ARKEO 2235) # (HA-AS)]

Spring. 4 credits. K. Jordan. For description, see ANTHR 2235. (ASE)

[AMST 2360 Native People of the Northeast (also AIS/HIST 2360) # (HA-AS)]

4 credits. Next offered 2011-2012. J. Parmenter. (HI)

[AMST 2390 Seminar in Iroquois History (also HIST 2390) # (HA-AS)]

4 credits. Next offered 2011-2012. J. Parmenter. (HI)

AMST 2401 Introduction to Latino/a Literature (also ENGL/LSP 2400) (LA-AS)

Fall. 4 credits. M. P. Brady. For description, see ENGL 2400. (LT)

[AMST 2420 Religion and Politics in American History from J. Winthrop to R. Reed (also HIST/RELST 2420) (HA-AS)]

4 credits. Prerequisite: permission of instructor. Next offered 2010-2011. R. L. Moore. (HI)

AMST 2440 The United States in Vietnam (also HIST 2440) (HA-AS)

Spring. 4 credits. F. Logevall. For description, see HIST 2440. (HI)

AMST 2501 Race and Popular Culture (also HIST 2510) (HA-AS)]

Fall. 4 credits. M. Washington. For description, see HIST 2510. (HI)

[AMST 2510 20th-Century Women Writers (also ENGL/FGSS 2510) (LA-AS)]

4 credits. Next offered 2010-2011. E. DeLoughrey. For description, see ENGL 2510. (LT)]

[AMST 2520 Late 20th-Century Women Writers and Visual Culture (also ENGL 2520)]

4 credits. Next offered 2011-2012. (LT)]

AMST 2599 Latinos in the United States: Colonial Period to 1898 (also HIST/LSP 2600) # (HA-AS)]

Fall. 4 credits. M. C. Garcia. For description, see HIST 2610. (HI)

[AMST 2600 Introduction to American Indian Literature in the United States (also ENGL 2600) (LA-AS)]

4 credits. Next offered 2010-2011. E. Cheyfitz. (LT)]

[AMST 2610 Latinos in the United States: 1898 to the Present (also HIST/LSP 2610) (HA-AS)]

Spring. 4 credits. Next offered 2010-2011. M. C. Garcia. For description, see HIST 2610. (HI)]

AMST 2620 Asian American Literature (also AAS/ENGL 2620) (LA-AS)

Spring. 4 credits. S. Wong.
For description, see ENGL 2620. (LT)

AMST 2640 Introduction to Asian American History (also AAS 2130, HIST 2640) (HA-AS)

Fall. 4 credits. D. Chang.
For description, see HIST 2640. (HI)

AMST 2650 Introduction to African American Literature (also ENGL 2650) (CA-AS)

Fall. 4 credits. D. Woubshet.
For description, see ENGL 2650. (LT)

[AMST 2660 Introduction to Native American History (also AIS/HIST 2660) (HA-AS)]

4 credits. Next offered 2011–2012.
J. Parmenter. (HI)

AMST 2680 Culture and Politics of the 1960s (also ENGL 2680) (CA-AS)

Fall. 4 credits. P. Sawyer.
For description, see ENGL 2680. (LT)

AMST 2710 Social and Political Context of American Education (also EDUC/SOC 2710) (SBA-AS)

Fall. 4 credits. J. Sipple.
For description, see EDUC 2710. (ASE)

AMST 2720 The Atlantic World from Conquest to Revolution (also HIST 2720) # (HA-AS)

Spring. 4 credits. M. B. Norton.
For description, see HIST 2720. (HI)

[AMST 2721 Anthropological Representation: Ethnographies of Latino Culture (also ANTHR/LSP 2721) (CA-AS)]

3 credits. Next offered 2011–2012.
V. Santiago-Irizarry. (ASE)]

[AMST 2730 Women in American Society, Past and Present (also FGSS/HIST 2730) # (HA-AS)]

4 credits. Next offered 2010–2011.
M. B. Norton. (HI)]

AMST 2760 Survey of American Film (also FILM 2760, VISST 2300) (LA-AS)

Spring. 4 credits. Each student must enroll in a section and attend one screening per week. S. Haenni.

Focusing mostly on Hollywood film, this course surveys some major developments in and approaches to 20th-century American cinema. We trace changes in film aesthetics and film style, the development of the American cinema as an institution that comprises an industrial system of production, social and aesthetic norms and codes, and particular modes of reception. The course introduces methodological issues in American film history—especially questions of narrative, genre, stardom, and authorship—and focuses on the ways film shapes gender, race, class, ethnic, and national identities. Screenings include work by D. W. Griffith, John Ford, Howard Hawks, Alfred Hitchcock, and others and are supplemented by readings in film criticism and history. (LT)

AMST 2820 Photography and the American Landscape (also LA 2820)

Fall. 3 credits. A. Hammer.
For description, see LA 2820. (MV)

AMST 2980 Inventing an Information Society (ECE/ENGRG 2980, HIST 2920, STS 2921) (HA-AS)

Spring. 3 credits. R. Kline.
For description, see ECE 2980. (HI)

[AMST 3003 Working-Class America in Mass Media and Popular Culture (also ILRCB 3030)]

3 credits. Next offered 2011–2012. J. Cowie.
For description, see ILRCB 3030. (HI)]

[AMST 3030 African American Women in Slavery and Freedom (also FGSS 3070, HIST 3030) # (HA-AS)]

4 credits. Next offered 2010–2011.
M. Washington.]

[AMST 3031 Imagining America (also GOVT 3031) (CA-AS)]

4 credits. Next offered 2011–2012.
D. Rubenstein. (GP)]

[AMST 3050 Americans Abroad (CA-AS)]

Spring. 4 credits. Next offered 2011–2012.
S. Haenni.
Focuses on how fiction and film, from the 19th century to the present, have depicted Americans abroad. (LT)]

[AMST 3060 History of American Workers: 1960 to 1990s (also ILRCB 3060)]

3 credits. Next offered 2011–2012. J. Cowie.
For description, see ILRCB 3060. (HI)]

[AMST 3090 The Cinema and the American City (CA-AS)]

4 credits. Next offered 2011–2012.
S. Haenni. (HI)]

AMST 3102 Asian American Politics and Public Policy (also AAS 3901, CRP 3102/6107, AMST 6107) (CA-AS)

Spring. 3 credits. C. Lai.
For description, see CRP 3102. (GP)

[AMST 3111 Urban Politics (also GOVT 3111) (SBA-AS)]

4 credits. Next offered 2011–2012.
M. Shefter. (GP)]

AMST 3128 Americas Changing Faces (also GOVT 3128)

Summer only. 2 credits. Offered in Cornell in Washington Summer Program.
S. Jackson.
For description, see GOVT 3128.

[AMST 3130 U.S. Foreign Relations, 1750–1912 (also HIST 3130) # (HA-AS)]

4 credits. Next offered 2010–2011.
F. Logevall. (HI)]

AMST 3140 History of American Foreign Policy 1912 to the Present (also HIST 3140) (HA-AS)

Spring. 4 credits. F. Logevall.
For description, see HIST 3140. (HI)

[AMST 3141 Prisons (also GOVT 3141) (SBA-AS)]

4 credits. Next offered 2011–2012.
M. Katzenstein.
For description, see GOVT 3141. (GP)]

AMST 3150 Environmental History: The United States and Beyond (also HIST 3150) # (HA-AS)

Fall. 4 credits. A. Sachs.
For description, see HIST 3150. (HI)

[AMST 3161 The American Presidency (also GOVT 3161) (SBA-AS)]

4 credits. Next offered 2011–2012.
M. E. Sanders.
For description, see GOVT 3161. (GP)]

[AMST 3170 British–French North America (also HIST 3170) # (HA-AS)]

4 credits. Next offered 2011–2012.
J. Parmenter.
For description, see HIST 3170. (HI)]

[AMST 3171 Campaigns and Elections (also GOVT 3171) (SBA-AS)]

4 credits. Next offered 2011–2012. P. Enns.
For description, see GOVT 3171. (GP)]

[AMST 3180 American Constitutional Development (also HIST 3180) (HA-AS)]

4 credits. Next offered 2010–2011.
R. Polenberg. (HI)]

AMST 3181 The U.S. Congress (also GOVT 3181) (SBA-AS)

Spring. 4 credits. M. Shefter.
For description, see GOVT 3181. (GP)

[AMST 3191 Racial and Ethnic Politics (also GOVT/LSP 3191) (SBA-AS)]

4 credits. Next offered 2010–2011.
M. Jones-Correa. (GP)]

[AMST 3210 Colonial North America to 1763 (also HIST 3210) # (HA-AS)]

4 credits. Next offered 2010–2011.
M. B. Norton. (HI)]

AMST 3230 American Economic History (also ECON 3230) # (SBA-AS)

Fall. 4 credits. T. Lyons.
For description, see ECON 3230. (ASE)

[AMST 3240 Varieties of American Dissent, 1880 to 1990 (also HIST 3240) (HA-AS)]

4 credits. Next offered 2011–2012.
N. Salvatore. (HI)]

[AMST 3241 Inequality and American Democracy (also GOVT 3241) (SBA-AS)]

4 credits. Next offered 2011–2012.
S. Mettler.
For description, see GOVT 3241. (GP)]

[AMST 3248 Iroquois Archaeology (also AIS/ANTHR/ARKEO 3248) # (HA-AS)]

4 credits. Next offered 2011–2012.
K. Jordan. (ASE)]

[AMST 3250 Age of the American Revolution, 1754 to 1815 (also HIST 3250) # (HA-AS)]

4 credits. Next offered 2010–2011.
M. B. Norton. (HI)]

AMST 3251 History of the Family in the United States (also FGSS/HIST 3251) (HA-AS)

Spring. 4 credits. T. Carroll.
For description, see HIST 3251. (HI)

[AMST 3310 Causes of the American Civil War, 1815 to 1860 (also HIST 3310) # (HA-AS)]

4 credits. Next offered 2011–2012.
E. Baptist. (HI)]

AMST 3330 Ways of Knowing: Indigenous and Local Ecological Knowledge (also AIS/NTRES 3330)

Fall. 3 credits. K. Kassam.
For description, see NTRES 3330.

- [AMST 3370 Contemporary American Theatre (also THETR 3370) (LA-AS)]**
4 credits. Next offered 2011-2012.
S. Warner.
For description, see THETR 3370. (LT)]
- [AMST 3400 Recent American History, 1925 to 1965 (also HIST 3400) (HA-AS)]**
4 credits. Next offered 2011-2012.
R. Vanderlan.]
- [AMST 3410 Recent American History, 1965 to Present (also HIST 3410) (HA-AS)]**
4 credits. Next offered 2011-2012.
Staff. (HI)]
- AMST 3430 American Civil War and Reconstruction, 1860 to 1877 (also HIST 3430) # (HA-AS)**
Fall. 4 credits. E. Baptist.
For description, see HIST 3430. (HI)
- AMST 3431 Obama and Lincoln (also HIST 3431) (HA-AS)**
Fall. 4 credits. E. Baptist.
For description, see HIST 3431.
- [AMST 3450 Cultural and Intellectual Life of 19th-Century Americans (also HIST 3450) # (HA-AS)]**
4 credits. Next offered 2010-2011. A. Sachs. (HI)]
- AMST 3460 Modernization of the American Mind (also HIST/RELST 3460) (HA-AS)**
Fall. 4 credits. R. L. Moore.
For description, see HIST 3460. (HI)
- AMST 3470 Asian American Women's History (also AAS/FGSS/HIST 3470) (CA-AS)**
Spring. 4 credits. D. Chang.
For description, see HIST 3470. (HI)
- [AMST 3480 Film Noir (also FILM 3460, VISST 3146) (LA-AS)]**
4 credits. Recommended: some course work in film. Next offered 2011-2012.
S. Haenni.
Focuses on Hollywood films of the 1940s/1950s known for their stylishness and commentary on the dark side of American life, and on "neo-noir" from the 1970s to the present. (LT)]
- [AMST 3481 Studies of Women's Fiction: Gender, Nature and the Environment (also ENGL/FGSS 3480) (LA-AS)]**
4 credits. Next offered 2011-2012.
K. McCullough.
For description, see ENGL 3480. (LT)]
- AMST 3550 Latinos, Law and Identity (also DSOC/LSP 3550) # (SBA-AS)**
Fall. 3 credits. R. Mize.
For description, see DSOC 3550. (ASE)
- [AMST 3570 Engineering in American Culture (also ENGRG/HIST/STS 3570, STS 3571)]**
4 credits. Next offered 2011-2012. R. Kline.
For description, see ENGRG 3570. (HI)]
- [AMST 3600 Another World Is Possible: The American Left Since the 1960s (also ENGL 3600) (LA-AS)]**
4 credits. Next offered 2010-2011.
P. Sawyer. (LT)]
- AMST 3605 U.S. Art from FDR to Reagan (also ARTH 3605) (LA-AS)**
Fall. 4 credits. J. E. Bernstock.
For description, see ARTH 3605. (MV)
- [AMST 3610 Studies in the Formation of U.S. Literature: Emerson to Melville (also ENGL 3610) # (LA-AS)]**
4 credits. Next offered 2011-2012. D. Fried.
For description, see ENGL 3610. (LT)]
- [AMST 3620 Studies in U.S. Literature After 1950: Native Daughters Speak (also ENGL 3640) (LA-AS)]**
4 credits. Next offered 2011-2012.
L. Donaldson. (LT)]
- [AMST 3630 Studies in U.S. Literature: The Age of Realism and Naturalism (also ENGL/FGSS 3630) (LA-AS)]**
4 credits. Next offered 2011-2012.
K. McCullough. (LT)]
- AMST 3640 Studies in U.S. Literature After 1950: American Literature, the 1980s (also ENGL 3640) (LA-AS)**
Spring. 4 credits. D. Woubshet.
For description, see ENGL 3640. (LT)
- [AMST 3650 American Literature Since 1945 (also ENGL 3650) (LA-AS)]**
4 credits. Next offered 2010-2011.
B. Maxwell. (LT)]
- [AMST 3655 Politics and Literature (also GOVT 3655) (LA-AS)]**
4 credits. Next offered 2010-2011. J. Frank.
For description, see GOVT 3655. (GP)]
- [AMST 3660 Studies in U.S. Fiction Before 1900: The 19th-Century American Novel (also ENGL 3660) # (LA-AS)]**
4 credits. Next offered 2010-2011.
S. Samuels. (LT)]
- AMST 3665 American Political Thought from Madison to Malcolm X (also GOVT 3665, HIST 3160) # (HA-AS)**
Fall 4 credits. I. Kramnick.
For description, see GOVT 3665. (GP)
- AMST 3670 Studies in U.S. Fiction After 1900: 20th-Century American Fiction: Novels and Short Stories in the Americas (also ENGL 3670) (LA-AS)**
Fall. 4 credits. M. P. Brady.
For description, see ENGL 3670. (LT)
- [AMST 3708 Topics in U.S. Women's History (also HIST 3780)]**
4 credits. Next offered 2011-2012.
M. B. Norton. (HI)]
- AMST 3711 American Poetry to 1950 (also ENGL 3711) (LA-AS)**
Fall. 4 credits. R. Gilbert.
For description, see ENGL 3711. (LT)
- AMST 3712 American Poetry Since 1950 (also ENGL 3712) (LA-AS)**
Spring. 4 credits. R. Gilbert.
For description, see ENGL 3712. (LT)
- AMST 3720 Food, Gender and Culture (also FGSS 3720, ENGL 3721)**
Fall. 4 credits. K. McCullough.
For description, see FGSS 3720. (LT)
- AMST 3735 Political Freedom (also GOVT 3735)**
Spring. 4 credits. J. Frank.
For description, see GOVT 3735. (GP)
- AMST 3740 Painting in 19th-Century America (also ARTH/VISST 3740) # (CA-AS)**
Fall. 4 credits. L. L. Meixner.
For description, see ARTH 3740. (MV)
- AMST 3750 Comparative Race and Ethnicity (also DSOC/LSP 3750) # (SBA-AS)**
Spring. 4 credits. R. Mize.
For description, see DSOC 3750. (ASE)
- AMST 3770 Herman Melville (also ENGL 3770) # (HA-AS)**
Fall. 4 credits. M. Cobb.
For description, see ENGL 3770.
- [AMST 3777 The United States (also ANTHR/LSP 3777) # (CA-AS)]**
4 credits. Next offered 2011-2012.
V. Santiago-Irizarry. (ASE)]
- AMST 3801 Asian American Urban Experience (also AAS/CRP 3801/6801, AMST 6801)**
Fall. 3 credits. C. Lai.
For description, see AAS 3801. (HI)
- AMST 3810 American Architecture and Building I (also ARCH 3810)**
Fall. 3 credits. Prerequisites: ARCH 1801-1802 or permission of instructor.
M. Woods.
For description, see ARCH 3810. (MV)
- AMST 3811 American Architecture and Building II (also ARCH 3811)**
Spring. 3 credits. Prerequisites: ARCH 1801-1802 or permission of instructor.
M. Woods.
For description, see ARCH 3811. (MV)
- [AMST 3812 Edge Cities: Celluloid New York and Los Angeles (also ARCH/FILM/VISST 3812) (CA-AS)]**
4 credits. Next offered 2011-2012.
S. Haenni and M. Woods. (MV)]
- [AMST 3818 Special Topics in the History of Architecture and Urbanism (also ARCH 3818)]**
3 credits. Prerequisites: ARCH 1801-1802 or permission of instructor. Next offered 2011-2012. M. Woods.
For description, see ARCH 3818. (MV)]
- AMST 3820 Poetry and Poetics of Americas (also COML/LATA/SPAN 3800) (LA-AS)**
Fall. 4 credits. J. Monroe.
For description, see COML 3800. (LT)
- [AMST 3911 Science in the American Polity, 1960 to Now (also GOVT 3091, STS 3911) (SBA-AS)]**
4 credits. Next offered 2011-2012. J. Reppy.
For description, see STS 3911. (GP)]
- [AMST 3930 International Film of the 1970s (also COML/FILM/VISST 3930) (LA-AS)]**
4 credits. Next offered 2011-2012.
S. Haenni.
For description, see FILM 3930. (LT)]
- AMST 3950 Race, Space, and Place (also AAS 3950, CRP 3101/6101, AMST 6950) (CA-AS)**
Fall. 3 credits. C. Lai.
For description, see CRP 3101. (HI)
- [AMST 3970 Policing and Prisons in American Culture (also ENGL 3970) (CA-AS)]**
4 credits. Next offered 2011-2012.
B. Maxwell. (LT)]
- [AMST 3981 Latino/a Popular Cultural Practices (also ENGL/LSP 3980) (CA-AS)]**
4 credits. Next offered 2011-2012.
M. P. Brady.
For description, see ENGL 3980. (LT)]

AMST 4030 Advanced Seminar in Poetry: A. R. Ammons, John Asbury, and Adrienne Rich (also ENGL 4030) (LA-AS)

Fall. 4 credits. R. Gilbert.
For description, see ENGL 4030. (LT)

[AMST 4032 Immigration and Politics Research Seminar (also GOVT/LSP 4032) (SBA-AS)

4 credits. Next offered 2011–2012.
M. Jones-Correa. (GP)

[AMST 4041 American Political Development in the 20th Century (also AMST 6121, GOVT 4041/6121) (HA-AS)

4 credits. Next offered 2010–2011.
M. E. Sanders. (GP)

[AMST 4050 U.S.–Cuba Relations (also AMST 6050, HIST/LSP 4050/6050)

4 credits. Next offered 2011–2012.
M. C. Garcia. (HI)

[AMST 4061 Politics of Slow-Moving Crises (also AMST/GOVT 6161, GOVT 4061) (SBA-AS)

4 credits. Next offered 2011–2012.
M. Jones-Correa. (GP)

AMST 4141 Women Activism and Social Change in the 20th Century (also HIST/ FGSS 4141) (HA-AS)

Fall. 4 credits. T. Carroll. (HI)
For description, see HIST 4141.

AMST 4142 Causes and Consequences of U.S. Foreign Policy (also GOVT 4142/6142, AMST 6142) (SBA-AS)

Fall. 4 credits. E. Sanders.
For description, see GOVT 4142. (GP)

AMST 4180 Audio Documentary: Stories from the Land (also LA 4180)

Fall. 3 credits. A. Hammer.
For description, see LA 4180. (MV)

[AMST 4200 Asian American Communities (also HIST 4200, AAS 4240) (HA-AS)

4 credits. Limited to 15 students. Next offered 2010–2011. D. Chang. (HI)

AMST 4222 Political Culture (also GOVT 4222)

Spring. 4 credits. R. Bensel.
For description, see GOVT 4222. (GP)

[AMST 4231 The 1960s: Conceptualizing the Future from the Past (also GOVT 4231) (CA-AS)

4 credits. Next offered 2010–2011.
J. Kirshner and T. Lowi.
For description, see GOVT 4231. (GP)

AMST 4241 Contemporary American Politics (also AMST 6291, GOVT 4241/6291) (HA-AS)

Spring. 4 credits. M. Shefter.
For description, see GOVT 4241. (GP)

[AMST 4260 The West and Beyond: Frontiers and Borders in American History and Culture (also HIST 4260) (HA-AS)

4 credits. Next offered 2010–2011. A. Sachs.
For description, see HIST 4260. (HI)

AMST 4261 Commodification and Consumerism in Historical Perspective: Sex, Rugs, Salt, and Coal (also HIST 4261) @ # (HA-AS)

Fall. 4 credits. A. Sachs.
For description, see HIST 4261. (HI)

AMST 4272 Historical Archaeology of Indigenous Peoples (also AIS 4270/7720, AMST 6272, ANTHR/ ARKEO 4272/7272) # (HA-AS)

4 credits. K. Jordan.
For description, see ANTHR 4272. (ASE)

AMST 4281 Government and Public Policy: An Introduction to Analysis and Criticism (also AMST 6281, GOVT 4281/7281) (SBA-AS)

Fall. 4 credits. T. Lowi.
For description, see GOVT 4281. (GP)

AMST 4400 Seminar in Recent American History (also HIST 4400) (HA-AS)

Fall. 4 credits. R. Polenberg.
For description, see HIST 4400.

[AMST 4440 American Men (also FGSS 4450, HIST 4440) (HA-AS)

4 credits. Next offered 2010–2011.
E. Baptist. (HI)

[AMST 4508 Exhibiting Cultures (also AMST 6508, ARTH 4508/6508, ASRC 4504/6508) (CA-AS)

4 credits. Next offered 2010–2011.
C. Finley. (MV)

AMST 4509 Black Arts Movement (also ARTH 4509/ASRC 4505) (CA-AS)

Summer. 4 credits. C. Finley.
For description, see ARTH 4509. (MV)

AMST 4510 Multiculturalism and Education (also EDUC/LSP 4510)

Fall. 3 credits. S. Villenas.
For description, see EDUC 4510. (ASE)

AMST 4530 20th-Century Women Writers of Color (also AAS/ENGL/FGSS 4530) (LA-AS)

Fall. 4 credits. S. Wong.
For description, see ENGL 4530. (LT)

AMST 4585 American Political Thought (also AMST 6585, GOVT 4585/6585) (HA-AS)

Fall. 4 credits. J. Frank.
For description, see GOVT 4585. (GP)

[AMST 4600 Melville (also ENGL 4600) # (LA-AS)

4 credits. Next offered 2011–2012.
B. Maxwell. (LT)

[AMST 4616 Interpreting Race and Racism: DuBois (also GOVT 4616) (HA-AS)

4 credits. Next offered 2011–2012.
A. M. Smith.
For description, see GOVT 4616. (GP)

[AMST 4625 Sexuality and the Law (also AMST 6625, FGSS 4610/7620, GOVT 4625/7625) (KCM-AS)

4 credits. Next offered 2011–2012.
A. M. Smith. (GP)

[AMST 4635 Feminist Theory/Law and Society (also GOVT 4635) (CA-AS)

4 credits. Next offered 2010–2011.
A. M. Smith.
For description, see GOVT 4635. (GP)

[AMST 4660 Iroquois History (also AIS/ HIST 4660) # (HA-AS)

4 credits. Not open to freshmen. Next offered 2010–2011. J. Parmenter. (HI)

[AMST 4662 Contemporary American Indian Poets (also ENGL 4662) (LA-AS)

4 credits. Next offered 2011–2012.
E. Cheyfitz. (LT)

[AMST 4690 Faulkner (also ENGL 4690) (LA-AS)

4 credits. Next offered 2011–2012. K. Attell. (LT)

[AMST 4750 Seminar in Cinema I (also FILM 4750) (LA-AS)

4 credits. Next offered 2011–2012.
D. Fredericksen.
For description, see FILM 4750. (LT)

AMST 4755 Seminar in Cinema I (also ENGL 4750)

Spring. 4 credits. D. Woubshet.
For description, see ENGL 4750.

[AMST 4780 Intersections in Lesbian Fiction (also ENGL 4780, FGSS 4770) (LA-AS)

4 credits. Next offered 2011–2012.
K. McCullough. (LT)

[AMST 4790 Gender and Visual Culture in Women's Literature (also ENGL/FGSS 4790, VISST 4800) (LA-AS)

4 credits. Next offered 2012–2013.
S. Samuels. (LT)

[AMST 4809 Politics of '70s Film (also GOVT 4809) (SBA-AS)

4 credits. Next offered 2011–2012.
J. Kirshner. (GP)

[AMST 4821 Religious and Secular in American Culture (also HIST/RELST 4821) (HA-AS)

4 credits. Next offered 2011–2012.
R. L. Moore. (HI)

AMST 4850 Immigration: History, Theory, and Practice (also HIST/LSP 4850) (HA-AS)

Fall. 4 credits. M. C. Garcia.
For description, see HIST 4850. (HI)

AMST 4851 Refugees (also HIST 4851) (HA-AS)

Spring. 4 credits. M. C. Garcia.
For description, see HIST 4851.

[AMST 4900 New World Encounters, 1500 to 1800 (also AIS/HIST 4900) (HA-AS)

4 credits. Next offered 2012–2013.
J. Parmenter. (HI)

[AMST 4970 Jim Crow and Exclusion-Era America (also AAS/HIST 4970, AMST/ HIST 6970) (HA-AS)

4 credits. Next offered 2011–2012.
D. Chang. (HI)

AMST 4997 Research Seminar in American Studies (also HIST 4997)

Fall or spring. Offered in Cornell in Washington Program only. S. Jackson.
For description, see HIST 4997. (HI)

AMST 4998 Politics and Policy: Theory, Research, and Practice (also ALS/ CAPS/GOVT 4998, PAM 4060)

Fall and spring. 8 credits each semester.
S. Jackson.
Offered in Cornell in Washington Program. This course, taught in Washington, D.C., forms the core of the public policy option of the Cornell in Washington Program. (GP)

AMST 5710 Social and Political Context of American Education (also AMST 6710, EDUC 2710/5710, SOC 2710/5710)

Fall. 4 credits. J. Sipple.
For description, see EDUC 2710. (ASE)

[AMST 6050 U.S.-Cuba Relations (also AMST/HIST/LSP 4050/6050)

4 credits. Next offered 2011-2012.
M. C. Garcia. (HI)

[AMST 6101 African-American Historiography (also HIST 6101)

4 credits. Next offered 2010-2011.
M. Washington. (HI)

AMST 6102 Asian American Politics and Public Policy (also AMST 3102, CRP 3102/6107, AAS 3901)

Spring. 3 credits. C. Lai.
For description, see CRP 3102.

[AMST 6121 American Political Development in the 20th Century (also AMST 4041, GOVT 4041/6121)

4 credits. Next offered 2011-2012.
E. Sanders.
For description, see GOVT 4041. (GP)

AMST 6142 Causes and Consequences of U.S. Foreign Policy (also AMST/GOVT 4142/6142)

Fall. 4 credits. E. Sanders.
For description, see GOVT 4142. (GP)

[AMST 6161 Politics of Slow-Moving Crises (also AMST/GOVT 4061, GOVT 6161)

4 credits. Next offered 2011-2012.
M. Jones-Correa. (GP)

AMST 6202 Political Culture (also GOVT 6202)

4 credits. R. Bensel.
For description, see GOVT 6202. (GP)

[AMST 6248 Iroquois Archaeology (also AIS/ANTHR/ARKEO 6248)

4 credits. Next offered 2011-2012.
K. Jordan. (ASE)

AMST 6272 Historical Archaeology (also AMST 4272, ANTHR/ARKEO 4272/7272)

Fall. 4 credits. Next offered 2011-2012.
K. Jordan.
For description, see ANTHR 4272. (ASE)

AMST 6281 Government and Public Policy: An Introduction to Analysis and Criticism (also AMST 4281, GOVT 4281/7281)

Fall. 4 credits. T. Lowi.
For description, see GOVT 4281. (GP)

AMST 6291 Contemporary American Politics (also AMST 4241, GOVT 4241/6291)

Spring. 4 credits. M. Shefter.
For description, see GOVT 4241. (GP)

AMST 6301 Institutions (also GOVT 6301)

Fall. 4 credits. R. Bensel.
For description, see GOVT 6301. (GP)

[AMST 6424 Ethnoracial Identity in Anthropology, Language, and Law (also ANTHR/LSP 6424, LAW 7231)

4 credits. Next offered 2011-2012.
V. Santiago-Irizarry. (ASE)

[AMST 6550 Early Modern Atlantic World (also HIST 6550)

Spring. 4 credits. Next offered 2010-2011.
M. B. Norton. (HI)

AMST 6585 American Political Thought (also GOVT 4585/6585, AMST 4585)

Fall. 4 credits. J. Frank.
For description, see GOVT 4585.

AMST 6611 What Is a Just Society?: Nature American Philosophies and the Limits of Capitalism's Imagination (also ENGL 6611)

Spring. 4 credits. E. Cheyfitz.
For description, see ENGL 6611.

[AMST 6625 Sexuality and the Law (also AMST 4625, FGSS 4610/7620, GOVT 4625/7625)

4 credits. Next offered 2011-2012.
A. M. Smith. (GP)

[AMST 6631 American Poetry, 1955-1980 (also ENGL 6631)

4 credits. Next offered 2011-2012.
R. Gilbert. (LT)

[AMST 6645 Democratic Theory (also GOVT 6645)

4 credits. Next offered 2010-2011. J. Frank.
For description, see GOVT 6645. (GP)

[AMST 6690 Gift and Contract in the 19th-Century United States: Social and Sexual Constructions of Whiteness, Race, and Ethnicity (also ENGL 6690)

4 credits. Next offered 2011-2012.
S. Samuels. (LT)

AMST 6801 Asian American Urban Experience (also AAS/CRP 3801/6801, AMST 3801)

Fall. 3 credits. C. Lai.
For description, see AAS 3801. (HI)

[AMST 6811 James Baldwin (also ENGL/FGSS 6811)

4 credits. Next offered 2011-2012.
D. Woubshet. (LT)

AMST 6950 Race, Space, and Place (also AMST/AAS 3950, CRP 3101/6101)

Fall. 3 credits. C. Lai.
For description, see CRP 3101.

[AMST 6970 Jim Crow and Exclusion Era America (also AMST 4970, HIST 4970/6970)

4 credits. Next offered 2011-2012.
D. Chang. (HI).

Honors

Please see description of major for information about registration in these courses.

AMST 4993-4994 Honors Essay Tutorial

4993, fall; 4994, spring. 4 credits. See Director of American Studies for appropriate advisors. (HR)

ANTHROPOLOGY

A. Willford, chair; H. Miyazaki and N. Russell, directors of graduate studies; S. Langwick, director of undergraduate studies; A. Clark Arcadi, J. Fajans, M. Fiskesjo, F. Gleach, D. Greenwood, J. Henderson, D. Holmberg, K. Jordan, K. March, H. Miyazaki, V. Munasinghe, P. Nadasy, A. Riles, N. Russell, S. Sangren, V. Santiago-Irizarry, M. Small, T. Volman, M. Welker. Emeritus: R. Ascher, B. J. Isbell, B. Lambert, J. Siegel, R. Smith.

Anthropology is one of the most diverse disciplines in the university. Spanning human evolution, the development and heterogeneity of language and culture, human history, and the diversity of cultures past and present, the field has broad scope, uses a variety of methods, addresses basic issues about human origins and human life, and maintains commitment to understanding social life and using this understanding to improve society. Anthropology is an ideal "liberal arts" major. It also serves as a major that, when well designed by the student with his or her advisor, prepares students for a wide range of professional careers, e.g., law, medicine, foreign service, human rights, social services, international development, and business, among others.

Courses for nonmajors: Anthropology welcomes nonmajors into many of its courses. Unless prerequisites are explicitly stated, 2000- and 3000-level courses do not have formal prerequisites and students without prior experience in anthropology are welcome in these classes. For additional information, see the anthropology department web page (falcon.arts.cornell.edu/Anthro).

The Major

The major is structured to provide both general grounding in three subfields of anthropology (sociocultural anthropology, anthropological archaeology, and biological anthropology) and detailed focus on a particular area of concentration. Areas of concentration include a wide variety of subjects within and between these three subfields. Topics ranging from identity politics and globalization to prehistory and human evolution can be pursued in classes focused on every major geographical region in the world. Upper-level courses span a range of topical and theoretical issues related to religion, gender, economics, colonialism, democratization, prehistoric cultures, race, behavioral evolution, and conservation, to name a few.

No prerequisites are required to enter the anthropology major. Students should see the director of undergraduate studies to apply to the major and obtain an advisor. Majors prepare a short statement about their interests and goals for the major, and then meet with their advisor. Majors and advisors collaboratively build a program of study that reflects the student's individual interests and the intellectual breadth of the field. Our goal is to provide a close and supportive advising relationship and a strong and coherent structure for the student's major.

A minimum of 37 credits are necessary to complete the major. To complete the major, students must take:

- One class of 3 or more credits in each of the three subfields (sociocultural,

archaeological, biological) at the 1000 or 2000 level.

- ANTHR 3000: Introduction to Anthropological Theory
- Two other courses of at least 4 credits at the 3000 level that are designated “comparative survey” courses in the catalog.
- Two 4000-level courses, one of which must be a seminar course in your senior year (4000, 4258, 4260, and 4263 are not seminar courses and do not fill the requirements).
- An additional 8 credits in elective courses, which may be in cognate disciplines with the approval of your advisor.

Exceptions to these requirements may be granted if a written petition is approved by the director of undergraduate studies.

No S–U credits or First-Year Writing Seminars may count toward the major. A letter grade of C– or better is required in all courses counted toward the major.

Study abroad and off-campus study programs:

The Department of Anthropology encourages students to consider a semester of study abroad or off-campus study developed as an integral part of the student’s major concentration. The director of undergraduate studies serves as the anthropology study abroad advisor.

The Cornell–Nepal Study Program: The Cornell–Nepal Study Program is a joint program of Cornell University and Tribhuvan University, the national university of Nepal. Qualified juniors, seniors, and first- or second-year graduate students work with faculty from both universities to prepare for and undertake field research projects in Nepal. Students receive 15 credits per semester; students may enroll for either fall or spring semester, or for the entire year; application is through Cornell Abroad. For further information, consult David Holmberg or Kathryn March in the Department of Anthropology.

Other anthropologically relevant study abroad options, using existing Cornell Abroad and off-campus options, can be worked out in consultation with the major advisor, the anthropology study abroad advisor, and Cornell Abroad.

Honors

Honors in anthropology are awarded for excellence in the major, which includes overall GPA and completion of an honors thesis. Undergraduate students interested in working for an honors degree should apply to the chair of the Honors Committee in the second semester of their junior year (requests for late admission may be considered, but not later than the second week of the first semester of the senior year). It is the student’s responsibility to identify an appropriate topic for a thesis and to find a faculty member willing to sponsor and supervise the research; the advisor and at least the general subject of the thesis must be identified at the time of application for admission to the Honors Program. Note that clearance from the University Committee on Human Subjects usually is required before research involving living people may begin; students contemplating such research should begin to work with their thesis advisors to design their

investigations and obtain the clearance well in advance of the date when the involvement with research subjects is to begin.

Admission to the Honors Program requires an overall GPA of 3.3 or greater and a 3.5 GPA in the major. In addition, the student should have no outstanding Incompletes in courses that will be used toward the major (provisional admission with Incompletes is possible at the discretion of the chair of the Honors Committee on evidence that a good faith effort to finish them is under way). Under special circumstances, a student with an overall GPA of 3.0 may petition for admittance to the program.

Writing an honors thesis typically is a two-semester project involving 8 credits of course work; most students do this work during their senior year. During their first semester of honors work, students typically register for (1) ANTHR 4983 Honors Thesis Research (3 credits); and (2) ANTHR 4991 Honors Workshop I (1 credit). During their second semester of honors work, students typically register for (1) ANTHR 4984 Honors Thesis Write-up (2 credits); and (2) ANTHR 4992 Honors Workshop II (2 credits). The two-course/term arrangement reflects the division of supervision over the thesis between the thesis advisor and the chair of the Honors Committee. The thesis advisor is ultimately responsible for guiding the scholarly development of the thesis; the chair of the Honors Committee is mainly responsible for assuring timely progress toward completion of the thesis, and providing a context for students in the Honors Program to share ideas (both editorial and substantive) as their theses progress.

Special Programs and Facilities

Collections: the department has an extensive collection of archaeological and ethnological materials housed in the Anthropology Collections. A limited number of students can make arrangements to serve as interns in the Anthropology Collections. Olin Library houses some of the most extensive collections of materials on the ethnology of Southeast Asia, South Asia, East Asia, and Latin America to be found anywhere in the United States. The biological anthropology laboratory (B65 McGraw Hall) houses an extensive collection of materials for teaching purposes, including (1) human skeletal remains, (2) articulated skeletons and cranial casts of primates, and (3) casts of important fossils in the human lineage.

Independent Study: specialized individual study programs are offered in ANTHR 4910, Topics in Anthropology, a course open to a limited number of juniors and seniors who have obtained permission and supervision of a faculty member. Undergraduates should note that many 6000-level courses are open to them by permission of the instructor.

Colloquia: The Department of Anthropology holds colloquia almost every week of the semester on Friday at 3:30 p.m. in 215 McGraw Hall. Faculty members from Cornell and other universities participate in discussions of current research and problems in anthropology. Students are encouraged to attend.

For more complete information about the anthropology major, see the director of undergraduate studies or visit the Department

of Anthropology web page (falcon.arts.cornell.edu/Anthro).

I. Introductory Courses

Each of these Introductory Courses provides an introduction to one of the subfields of anthropology. They do not form a sequence; students can take them in any order and at any point during their time at Cornell.

ANTHR 1200 Ancient Peoples and Places @ # (HA-AS)

Spring. 3 credits. T. Volman.

A broad introduction to archaeology—the study of material remains to answer questions about the human past. Case studies highlight the variability of ancient societies and illustrate the varied methods and interpretive frameworks archaeologists use to reconstruct them. This course can serve as a platform for both archaeology and anthropology undergraduate majors.

ANTHR 1300 Human Evolution: Genes, Behavior, and the Fossil Record (PBS Supplementary List)

Spring. 3 credits. Fee for lab usage and maintenance, \$5. A. Arcadi.

The evolution of humankind is explored through the fossil record, studies of the biological differences among current human populations, and a comparison with our closest relatives, the primates. This course investigates the roots of human biology and behavior with an evolutionary framework.

ANTHR 1400 The Comparison of Cultures @ (CA-AS)

Fall. 3 credits. Staff.

An introduction to cultural anthropology through ethnographies, or the descriptive accounts of anthropologists. Through readings and lectures, students acquaint themselves with a number of cultures from several parts of the world. The cultures range in form from those of small-scale tribal societies to those of state societies. Throughout the course, we attempt to make sense of exotic cultures in their own terms. Attention is focused on variation in cultural patterns as they are expressed in social, economic, and ritual practices. In this encounter, the principles of anthropology, as a comparative enterprise that poses distinct cultural systems in relief, will be developed. Fiction, films, and exercises supplement the formal anthropological materials.

ANTHR 1401 The Scope of Anthropology

Fall. 1 credit. Does not satisfy major requirement to take two broad introductory courses. Pre- or corequisite: ANTHR 1300 or 1400. S–U grades only. Staff.

This course is intended for majors in anthropology, prospective majors. Each week a different member of the faculty in anthropology at Cornell will make a presentation on the nature of their work within the field and discuss their interests with students. The course is meant to introduce the range of approaches found within anthropology and help students in planning future course work.

ANTHR 2400 Cultural Diversity and Contemporary Issues @ (SBA-AS)

Spring. 3 credits. M. Fiskesjo.

This course will introduce students to the meaning and significance of forms of cultural diversity for the understanding of

contemporary issues. Drawing from films, videos, and selected readings, students will be confronted with different representational forms that portray cultures in various parts of the world, and they will be asked to examine critically their own prejudices as they influence the perception and evaluation of cultural differences. We shall approach cultures holistically, assuming the inseparability of economics, kinship, religion, and politics, as well as interconnections and dependencies between world areas (e.g., Africa, Latin America, the West). Among the issues considered: "political correctness" and truth; nativism and ecological diversity; race, ethnicity, and sexuality; sin, religion, and war; global process and cultural integrity.

II. Sociocultural Anthropology

Sociocultural anthropology is rooted in the precise observation and rigorous analysis of human cultural capacities and human social practices, relations, and institutions. All sociocultural anthropology involves both inquiry into the diversity of human cultures (ethnography) and comparative analysis of human social dynamics (social theory). Historically, sociocultural anthropology specialized in the study of nonwestern peoples, but today there are few places and domains of human activity that sociocultural anthropologists do not study. To give a few examples, sociocultural anthropologists study nuclear weapons scientists in California, the transformation of state power in Russia, and the politics of development in India. They study how television producers in Egypt contribute to nationalism, the social effects of truth commissions in Guatemala and South Africa, and the emergence of new religious and social movements in Latin America. What distinguishes sociocultural anthropology as a field is its engagement with the full abundance of human lived experience and its integrated, comparative effort to make sense of the key processes shaping this experience. As such, sociocultural anthropology is an excellent, flexible choice of major. It teaches core critical, analytical, and expressive skills and important perspectives on human cultural creativity and social life that are widely applicable. Recently, our majors have gone into careers as diverse as academic scholarship, activism, advertising, consulting, design, film, journalism, marketing, medicine, NGO-work, and politics and government.

ANTHR 1400 The Comparison of Cultures @ (CA-AS)

Fall. 3 credits. Staff.
For description, see Introductory Courses.

ANTHR 1401 The Scope of Anthropology

Fall. 1 credit. Staff.
For description, see Introductory Courses.

ANTHR 2400 Cultural Diversity and Contemporary Issues @ (SBA-AS)

Spring. 3 credits. M. Fiskesjo.
For description, see Introductory Courses.

[ANTHR 2428 Slavery and Human Trafficking # (CA-AS)

Spring. 4 credits. Next offered 2010–2011.
M. Fiskesjo.]

ANTHR 2450 The Anthropology of Food and Cuisine @ (CA-AS)

Spring. 4 credits. J. Fajans.
You are what you eat! This course examines the way food is produced, prepared,

exchanged, presented, and given meaning in cultures around the world. It examines the symbolism of specific foodstuffs. Who prepares food and how is it done? Who feeds whom and how these relations are expressed and valued? In addition to looking at these questions we analyze ideas about commensality; how food is used in public contexts for presentation or exchange, and how food is a marker of gender, class, status, ethnicity, and identity. In addition to looking specifically at food, we analyze cultural ideas about gender, the body, and identity in terms of how these cultural patterns are produced and expressed through concrete activities like eating, fasting, and special diets. In this class we stress critical and comparative thinking about subjects we tend to take for granted.

ANTHR 2468 Medicine, Culture, and Society (CA-AS)

Fall. 3 credits. S. Langwick.
Medicine has become the language and practice through which we address a broad range of both individual and societal complaints. Interest in this "medicalization of life" may be one of the reasons that medical anthropology is currently the fastest-growing sub-field in anthropology. This course encourages students to examine concepts of disease, suffering, health, and well-being in their immediate experience and beyond. In the process, students will gain a working knowledge of ecological, critical, phenomenological, and applied approaches used by medical anthropologists. We will investigate what is involved in becoming a doctor, the sociality of medicines, controversies over new medical technologies, and the politics of medical knowledge. The universality of biomedicine (or hospital medicine) will not be taken for granted, but rather we will examine the plurality generated by the various political, economic, social, and ethical demands under which biomedicine has developed in different places and at different times. In addition, biomedical healing and expertise will be viewed in relation to other kinds of healing and expertise. Our readings will address medicine in North America as well as other parts of the world. In class, our discussions will return regularly to consider the broad diversity of kinds of medicine throughout the world, as well as the specific historical and local contexts of biomedicine.

[ANTHR 2546 South Asian Religions in Practice @ (CA-AS)

Fall. 3 credits. Next offered 2011–2012.
Staff.]

ANTHR 2560 Japanese Society Through Film @ (CA-AS)

Fall. 3 credits. H. Miyazaki.
This is an anthropological introduction to Japanese society through a critical investigation of a wide range of films from Ozu Yasujiro's classic films to Miyazaki Hayao's animated films. Topics of investigation include kinship and marriage, work and workplaces, gender and sexuality, bureaucracy, crime and legal culture, nationalism and nostalgia, and techno-scientific utopia.

[ANTHR 2721 Anthropological Representation: Ethnographies on Latino Culture (also AMST/LSP 2721) (CA-AS)

Fall. 3 credits. Next offered 2010–2011.
V. Santiago-Irizarry.]

ANTHR 3000 Introduction to Anthropological Theory (CA-AS)

Spring. 4 credits. P. Nadasdy.
This seminar course is designed for anthropology majors to give them an introduction to classical and contemporary social and anthropological theory and to help prepare them for upper-level seminars in anthropology. The seminar format emphasizes close reading and active discussion of key texts and theorists. The reading list will vary from year to year but will include consideration of influential texts and debates in 19th, 20th, and 21st century anthropological theory especially as they have sought to offer conceptual and analytical tools for making sense of human social experience and cultural capacities.

[ANTHR 3406 Gifts and Exchange (SBA-AS)

Spring. 4 credits. Comparative survey. Next offered 2010–2011. H. Miyazaki.]

[ANTHR 3410 Nationalism and Revivalism (CA-AS)

Spring. 4 credits. Comparative survey. Next offered 2011–2012. Staff.]

ANTHR 3420 Myth, Ritual, and Symbol (also RELST 3230) @ (CA-AS)

Spring. 4 credits. Comparative survey.
D. Holmberg.
Examines how systems of thought, symbolic forms, and ritual practice are formulated and expressed in primarily non-Western societies. Focuses on anthropological interpretations of space, time, cosmology, myth, classificatory systems (e.g., color, totems, food, dress, kinship), taboos, sacrifice, witchcraft, sorcery, and rites of passage (birth, initiation, marriage, death). Examines both the roles of specialists (e.g., spirit mediums, curers, priests, ascetics) and nonspecialists in producing these cultural forms.

ANTHR 3421 Sex and Gender in Cross-Cultural Perspective (also FGSS 3210) @ (SBA-AS)

Fall. 4 credits. Comparative survey.
K. March.
Introduction to the study of sex roles cross-culturally and to anthropological theories of sex and gender. Examines various aspects of the place of the sexes in social, political, economic, ideological, and biological systems to emphasize the diversity in gender and sex-role definitions around the world.

ANTHR 3422 Culture, Politics, and Environment in the Circumpolar North (also ANTHR 6422) (CA-AS)

Spring. 4 credits. P. Nadasdy.
This course examines the cultures and histories of the circumpolar North. The primary emphasis is on the North American Arctic and Subarctic with some attention to northern Eurasia for comparative purposes. The focus is on the indigenous peoples of the region and the socio-political and ecological dimensions of their evolving relationships with southern industrial societies.

[ANTHR 3428 Conflict, Dispute Resolution, and Law in Cultural Context (SBA-AS)

Fall. 4 credits. Comparative survey. Next offered 2011–2012. V. Santiago-Irizarry.]

ANTHR 3447 Sport @ (CA-AS)

Spring. 4 credits. S. Sangren.
Long overlooked by anthropologists, sport and recreation are increasingly recognized as

important windows into culture. Sport can be approached from a number of directions—interpreted as a ritual; viewed as a spectacle of ethnic, regional, or national identity; seen as a metaphor for life; understood as a major industry. This course will consider these and other approaches to sport, encouraging students to bring their own involvements in sport to reflect not only upon sport itself, but also upon how such reflection can illuminate cultural, psychological, and political dimensions of social life. Why, for example, do we take sport (and other forms of recreation) so seriously? Why do many of us apparently invest more passion in such pursuits than to life's allegedly more serious activities? How is sport integrated into people's identities? Readings will draw from popular literature and media as well as academic writing from a variety of disciplines (psychology, sociology, history) in addition to anthropology.

[ANTHR 3451 Global Movements of Cultural Heritage @ (CA-AS)]

Spring. 4 credits. Comparative survey. Next offered 2010–2011. M. Fiskesjo.]

[ANTHR 3461 Anthropology of Organizations (also ANTHR 6461) (SBA-AS)]

Spring. 4 credits. D. Greenwood. Next offered 2010–2011.]

[ANTHR 3462 Democratizing Research (also ANTHR 6462) (SBA-AS)]

Fall. 4 credits. D. Greenwood. Next offered 2010–2011.]

ANTHR 3465 Anthropology of the Body (also ANTHR 6465) (CA-AS)]

Fall. 4 credits. S. Langwick.

This course examines a range of texts that treat the body as the subject and object of cultural, technological, political and ethical processes. Students investigate the cultivation of physical and social bodies through ethnographic and historical materials concerning healing and medicine, discipline and labor, governance and religion, aesthetics and desire. The production and reproduction of bodies and embodied practices have long been central to the way that power works. In this class, we will read and discuss a range of approach to the body. There is much contention over how work, politics, environment, technologies, and violence shape the body and the senses. We will debate how histories of the body are intertwined with histories of gender, race, class, sexuality, (post)coloniality, modernization, science, transnationalism, and the webs of institution, ideas, and capital that comprise these phenomena. Some readings will investigate the complex mediations that account for the body as icon, text, metaphor, commodity, and raw material. Others will contend that serious attention to the production and reproduction of the body across different times and spaces challenge traditional notions of materiality and physicality. Because every examination of the body rests—implicitly or explicitly—in a theoretical and methodological approach to experience, we will also explore the histories of bodily senses, appetites and capabilities. Ultimately, our inquiry into contests over and reflections on “the body,” as well as specific bodies, aims to open up broader anthropological questions about authority, agency, sovereignties, and material life.

[ANTHR 3479 Culture, Language, and Thought (CA-AS)]

Spring. 4 credits. Comparative survey. Next offered 2010–2011. V. Santiago-Irizarry.]

[ANTHR 3514 Learning in Japan @ (SBA-AS)]

Spring. 4 credits. Next offered 2011–2012. H. Miyazaki.]

[ANTHR 3516 Power, Society, and Culture in Southeast Asia @ (CA-AS)]

Fall. 4 credits. Next offered 2010–2011. M. Welker.]

ANTHR 3545 Peoples and Cultures of the Himalayas (also ANTHR 7545) @ (CA-AS)]

Fall. 4 credits. K. March.

A comprehensive exploration of the peoples and cultures of the Himalayas. Ethnographic materials draw on the lifeways of populations living in the Himalayan regions of Bhutan, India, Nepal, and Tibet. Some of the cultural issues to be examined through these sources include images of the Himalayas in the West, forms of social life, ethnic diversity, political and economic history, and religious complexity.

[ANTHR 3546 Asian Minorities @ (CA-AS)]

Fall. 4 credits. Next offered 2010–2011. M. Fiskesjo.]

ANTHR 3554 Male and Female in Chinese Culture and Society (also FGSS 3440) @ (SBA-AS)]

Fall. 4 credits. S. Sangren.

This course explores the culture of gender, sex roles, and domestic relations in late traditional and modern Chinese society. Readings and lectures range from ethnographic descriptions of the dynamics of Chinese family life, kin relations, and socialization to representations of male and female in mythologies and ritual activities. The course also considers developments subsequent to political changes in China. Although the course's analytical focus is anthropological, readings will draw from the writings of historians and political scientists as well. A premise of the course is that understanding sex and gender in China is essential to understanding Chinese culture and its most fundamental values. The course also aims to introduce students interested in Chinese to techniques of anthropological analysis.

[ANTHR 3703 Asians in the Americas: A Comparative Perspective (also AAS 3030) (CA-AS)]

Fall. 4 credits. Next offered 2010–2011. V. Munasinghe.]

ANTHR 3734 Brazil: Many Cultures, One Nation @ (CA-AS)]

Spring. 4 credits. J. Fajans.

From the streets of Rio to the shores of the Amazon, Anthropology studies the lives, communities, beliefs, practices, and politics of the diverse region known as Brazil. This course will look at issues of race, gender, ethnicity, religion, ritual, environment, development, and human rights across Brazil. We will examine rural and urban cultures, discuss African and European Influences, and explore the relations between indigenous and national cultures. In this context, we will look at the roles that religion, food, dress, soccer, samba, and carnival all play in producing this vibrant culture.

[ANTHR 3777 The United States (also AMST/LSP 3777) (CA-AS)]

Fall. 4 credits. Next offered 2011–2012. V. Santiago-Irizarry.]

ANTHR 4000 Development of Anthropological Thought (also ANTHR 7000) (SBA-AS)]

Fall. 4 credits. Prerequisite: for undergraduates, two prior anthropology courses or permission of instructor. Staff. Examination of the history and development of anthropological theory and practice. Focuses on the differences and continuities among the various national and historical approaches that have come to be regarded as the schools of anthropology.

[ANTHR 4403 Ethnographic Field Methods (also ANTHR 6403) (SBA-AS)]

Fall. 4 credits. Next offered 2010–2011. V. Santiago-Irizarry.]

[ANTHR 4406 The Culture of Lives (also FGSS 4060) @ (CA-AS)]

Spring. 4 credits. Next offered 2010–2011. K. March.]

ANTHR 4419 Anthropology of Corporations (also ANTHR 7419) (SBA-AS)]

Spring. 4 credits. M. Welker.

This course develops an anthropological approach to corporations with a focus on large, profit-oriented, publicly traded corporations. To denaturalize the corporation, we will consider competing cultural logics internal to corporations as well as the contingent historical processes and debates that shaped the corporate form over the past two centuries. The course will examine processes through which various social groups have sought to alter and restrain corporations as well as reciprocal corporate attempts to reshape the social environment in which they operate.

ANTHR 4426 Ideology and Social Production (also ANTHR 7426) @ (SBA-AS)]

Spring. 4 credits. S. Sangren.

This course is premised on the notion that understanding social life requires understanding how social institutions are produced and sustained through time—that is to say, one must understand “society” as a process of production. By the same token, all cultures produce ideas or “representation” (e.g., about reality, nature, society, gender, authority) that serve to legitimize or validate each society's particular social arrangements. These ideologies play an important role in social production, on the one hand, and are also products of social processes, on the other. This course focuses on the linkages between ideology and social production in readings drawn from social theory and ethnographic case studies. We discuss strongly diverging views (psychoanalytic, postmodernist, poststructuralist, practice-theory, neo-Marxist) on how best to conceive social processes. An integrating theme is that understanding ideology and its alienating operations is essential in developing a coherent understanding of what culture, in the last analysis, is.

ANTHR 4429 Anthropology and Psychoanalysis (also ANTHR 7429) @ (SBA-AS)]

Fall. 4 credits. S. Sangren.

Psychoanalysis holds that desire emerges from the clash between individuals' predisposition and the need to accommodate to others in society. Yes anthropology has been resistant to the role that psychoanalytic theory might play in linking individual desire to culture. Does psychoanalysis have anything to offer cultural anthropology? Can understanding of collective institutions be advanced with reference to theories of individual motivation and desire? Conversely, can collective life be understood without reference to individual motivation and desire? Is desire best understood as sexual in nature, or is it better understood in more abstract and existential terms. With such questions in mind, this course surveys anthropology's engagements with psychoanalysis. We read theoretical works as well as ethnographically grounded case studies on topics ranging from religious experience, mythic narratives, the cultural construction of gender and desire, and modern popular culture.

[ANTHR 4437 Anthropology of Development (also ANTHR 7437) @ (CA-AS)]

Fall. 4 credits. Next offered 2010-2011.
M. Welker.]

ANTHR 4439 Sovereignty and Biopolitics @ # (CA-AS)

Spring. 4 credits. M. Fiskesjo.

This seminar course's starting point is Agamben's widely discussed ideas about "bare life" in relation to modern state sovereignty and to continuities with earlier forms of sovereignty. The course unfolds as a political-legal anthropology of sovereignty and citizenship, the exclusion of undesirables, and modern biopolitical control mechanisms. Readings will draw on classics from the anthropology and other literature on sovereignty and kingship, as well as case studies dealing with the modern Chinese state, the United States, the Soviet Union, etc.

[ANTHR 4444 God(s) and the Market (also ANTHR 7444) @ (CA-AS)]

Spring. 4 credits. Next offered 2012-2013.
H. Miyazaki.]

[ANTHR 4455 Anthropology in the Real World (SBA-AS)]

Spring. 4 credits. Next offered 2010-2012.
Staff.]

[ANTHR 4478 Taboo and Pollution (CA-AS)]

Spring. 4 credits. Next offered 2010-2011.
M. Fiskesjo.]

[ANTHR 4479 Ethnicity and Identity Politics: An Anthropological Perspective (also AAS 4790) (SBA-AS)]

Spring. 4 credits. Next offered 2010-2011.
V. Munasinghe.]

[ANTHR 4480 Anthropology and Globalization (also ANTHR 6480) (CA-AS)]

Fall. 4 credits. Next offered 2011-2012.
Staff.]

ANTHR 4513 Religion and Politics in Southeast Asia (also ASIAN 4413) @ (CA-AS)]

Spring. 4 credits. A. Willford.

This course explores how religious beliefs and practices in Southeast Asia have been transformed by the combined forces of colonialism, nationalism, and globalization. By examining both diversity and resurgence in

one of the world's most rapidly modernizing regions, we aim to understand the common economic, social, and political conditions that are contributing to the popularity of contemporary religious movements. At the same time, we also consider the unique ideological, theological, and cultural understandings behind different religions and movements. Through this process we also rethink conceptions of modernity.

ANTHR 4523 Making History on the Margins: The China-SE Asia Borderlands (also ANTHR 7523) # @ (HA-AS)]

Fall. 4 credits. M. Fiskesjo.

This seminar course is a new in-depth look at classical issues regarding the making of history, revisiting the mountain borderlands in between China and Southeast Asia made famous by anthropologists (Leach, Lévi-Strauss, Kirch, and Friedman) attempting to understand structure, history, and center-periphery transformations. Are the peoples of this region (Kachin, Wa, Naga, etc. predetermined by fateful forces and processes beyond their control, as prisoners of geography and circumstance, or what role do they have in the making of their own history? The course addresses themes from regional ethnography as well as theoretical issues, and forms an introduction to field research in this fertile region.

[ANTHR 4542 Violence, Symbolic Violence, Terror, and Trauma in South Asia and the Himalayas (also ANTHR 6542) @ (CA-AS)]

Fall. 4 credits. Next offered 2011-2012.
D. Holmberg.]

III. Anthropological Archaeology

Anthropological archaeology studies the diverse societies of the past using the material traces they left behind in the archaeological record. In addition to studying artifacts, archaeologists use unique methods to study the settings in which artifacts were produced and used by examining regional settlement patterns, the structure of sites and communities, the organization of activities, and ancient symbolism and social relations. The concerns of anthropological archaeology range from basic questions about continuity and change in the past, to application of hard science methods to date sites and determine the sources of artifacts, criticism of the uses to which the past is put in contemporary society, and protection of the archaeological record. Anthropological archaeology can be distinguished from other forms of archaeology (such as Classical or Art Historical archaeology) based on its emphasis on holistically studying past cultural systems, and by the theories and approaches it shares with sociocultural and biological anthropology. There are numerous career opportunities for anthropological archaeologists, including work with museums, government agencies, and historic preservation groups in addition to academic employment. Private companies engaged in federally mandated cultural resource management (or CRM) archaeology employ thousands of archaeologists in the United States, and similar management programs exist in many other countries.

ANTHR 1200 Ancient Peoples and Places (also ARKEO 1200) # @ (HA-AS)]

Spring. 3 credits. T. Volman.

For description, see Introductory Courses.

ANTHR 1401 The Scope of Anthropology

Fall. 1 credit. Staff.

For description, see Introductory Courses.

[ANTHR 2200 Early People: The Archaeological and Fossil Record (also ARKEO 2200) # (HA-AS)]

Spring. 3 credits. T. Volman.

A survey of the archaeological and fossil record of human evolution. Contributions by researchers from a variety of disciplines are highlighted, as are the discoveries that have enlivened the study of human evolution for more than a century. Critical evaluation of evidence and interpretation will be stressed. Demonstrations and films supplement the lectures.]

ANTHR 2201 Early Agriculture (also ARKEO 2201) # @ (HA-AS)]

Spring. 3 credits. N. Russell.

Throughout most of the human career, people survived by hunting and gathering wild foods. The advent of food production is one of the most profound changes in (pre)history. This course examines the current evidence for the appearance and spread of agriculture (plant and animal domestication) around the world. We will consider definitions of agriculture and domestication, the conditions under which it arises, the consequences for those who adopt it, and why it has spread over most of the world.

[ANTHR 2215 Stone Age Art (also ARKEO 2215) # (CA-AS)]

Fall. 3 credits. Next offered 2010-2011.
T. Volman.]

ANTHR 2220 Field Course in Iroquois Archaeology (also ARKEO 2220) # (SBA-AS)]

Summer only. 3 credits. K. Jordan.

This course offers hands-on training in archaeological field methods through survey and excavation at historic-period Iroquois sites in the Finger Lakes region. The majority of class time will be spent engaging in supervised fieldwork, supplemented by lectures introducing archaeological methods and Iroquois history and material culture. Excavations will gather data on Iroquois residential architecture and domestic activities. Students will master field procedures, record-keeping, and interpretation of field data; study Iroquois material culture; and write a short research paper (7-10 pages) that uses data generated by the project to evaluate a topic of anthropological interest. Most class time will be spent off-campus; transportation will be arranged by the instructor.

ANTHR 2235 Archaeology of North American Indians (also AIS/AMST 2350, ARKEO 2235) # (HA-AS)]

Spring. 3 credits. K. Jordan.

This introductory course surveys archaeology's contributions to the study of American Indian cultural diversity and change in North America north of Mexico. Lectures and readings will examine topics ranging from the debate over when the continent was first inhabited to present-day conflicts between Native Americans and archaeologists over excavation and the interpretation of the past. We will review important archaeological sites such as Chaco Canyon, Cahokia, Lamoka Lake, and the Little Bighorn battlefield. A principal focus will be on major transformations in lifeways such as the adoption of agriculture, the development of political-economic hierarchies,

and the disruptions that accompanied the arrival of Europeans to the continent.

ANTHR 3000 Introduction to Anthropological Theory (CA-AS)

Fall. 4 credits. P. Nadasdy.
For description, see Sociocultural Anthropology.

[ANTHR 3217 Stone Age Archaeology (also ARKEO 3217) (HA-AS)]

Fall. 4 credits. Comparative survey. Next offered 2010–2011. T. Volman.]

[ANTHR 3230 Humans and Animals (also ARKEO 3230) @ # (CA-AS)]

Fall. 4 credits. Comparative survey. Next offered 2010–2011. N. Russell.]

[ANTHR 3232 Politics of the Past (also ARKEO 3232) @ # (HA-AS)]

Fall. 4 credits. Comparative survey. Next offered 2010–2011. N. Russell.]

[ANTHR 3248 Iroquois Archaeology (also AIS/ARKEO 3248/6248, ANTHR 6248) # (HA-AS)]

Fall. 4 credits. Next offered 2011–2012. K. Jordan.]

[ANTHR 3255 Ancient Mexico and Central America (also ARKEO 3255) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011. J. Henderson.]

ANTHR 3256 Archaeology of the Andes (also ARKEO 3256) @ # (HA-AS)]

Fall. 4 credits. J. Henderson.
A survey of the rise and decline of civilizations in the Andean region of western South America before the European invasion. Key topics include the use of invasion-period and ethnographic information to interpret precolumbian societies, the emergence of settled farming life, and the development of the state.

[ANTHR 3269 Gender and Age in Archaeology (also ANTHR 6269, ARKEO 3269/6269, FGSS 3700/6700) (SBA-AS)]

Fall. 4 credits. Comparative survey. Next offered 2010–2011. N. Russell.]

ANTHR 3270 Environmental Archaeology (also ANTHR 6270, ARKEO 3270/6270) (PBS Supplementary List)]

Fall. 4 credits. Comparative survey. T. Volman.

A survey of selected topics in paleoenvironmental analysis and reconstruction, with emphasis on how they inform interpretations of the archaeological record. The course ranges broadly from a general consideration of human ecology and the role of environment in culture change to detailed study of specific techniques and approaches.

ANTHR 3272 Hunters and Gatherers (also ANTHR 6272, ARKEO 3272/6272) @ # (SBA-AS)]

Fall. 4 credits. Comparative survey. T. Volman.

A survey of contemporary and recent peoples with economies based completely or mainly on hunting and gathering. Selected societies from various parts of the world will be examined to compare aspects of technology, subsistence practices, organization and beliefs. The impact of contact with more economically advanced societies will be considered.

ANTHR 4209 Approaches to Archaeology (also ARKEO 4209) (CA-AS)]

Spring. 4 credits. K. Jordan.

An exploration of the concepts that have shaped modern archaeology. The course briefly examines the history of theoretical orientations in archaeology, then considers the variety of perspectives and interpretive frameworks that guide present-day investigations. Case studies illustrate the implications of the nature of the archaeological record for reconstructing subsistence and economic systems, trade, social and political organization, demography, and ideology. An undergraduate seminar especially recommended for undergraduate majors and graduate archaeologists but open to anyone with a serious interest in archaeology.

[ANTHR 4256 Mesoamerican Religion, Science, and History (also ARKEO 4256, LATA 4250) @ # (CA-AS)]

Spring. 4 credits. Next offered 2010–2011. J. Henderson.]

[ANTHR 4258 Archaeological Analysis (also ANTHR/ARKEO 6258, ARKEO 4258) (SBA-AS)]

Spring. 4 credits. Limited to 15 students. Prerequisite: archaeology course or permission of instructor. Next offered 2011–2012. J. Henderson.]

[ANTHR 4260 Field and Analytical Methods in Archaeology (also ARKEO 4260) # (SBA-AS)]

Spring. 4 or 6 credits. Next offered 2011–2012. K. Jordan.]

[ANTHR 4262 Catalhoyuk and Archaeological Practice (also ANTHR/ARKEO 7262, ARKEO 4262) @ # (HA-AS)]

Spring. 4 credits. Next offered 2011–2012. N. Russell.]

ANTHR 4263 Zooarchaeological Method (also ARKEO 4263) (PBS Supplementary List)]

Fall. 5 credits. N. Russell.

This is a hands-on laboratory course in zooarchaeological method: the study of animal bones from archaeological sites. It is designed to provide students with a basic grounding in identification of body part and taxon, aging and sexing, pathologies, taphonomy, and human modification. We will deal only with mammals larger than squirrels. While we will work on animal bones from prehistoric Europe, most of these skills are easily transferable to the fauna of other areas, especially North America. This is an intensive course that emphasizes laboratory skills in a realistic setting. You will analyze an assemblage of actual archaeological bones. It is highly recommended that students also take the course in Zooarchaeological Interpretation (ANTHR/ARKEO 4264) offered in the spring.

ANTHR 4264 Zooarchaeological Interpretation (also ARKEO 4264) (PBS Supplementary List)]

Spring. 4 credits. Prerequisite: permission of instructor. N. Russell.

This course follows from last semester's Zooarchaeological Method. We will shift our emphasis here from basic skills to interpretation, although you will continue to work with archaeological bones. We will begin by examining topics surrounding the basic interpretation of raw faunal data: sampling, quantification, taphonomy,

seasonality. We will then explore how to use faunal data to reconstruct subsistence patterns, social structure, and human/animal relations.

[ANTHR 4267 Origins of Agriculture (also ARKEO 4267) # (HA-AS)]

Spring. 4 credits. Next offered 2010–2011. N. Russell.]

[ANTHR 4268 Myth, History, and Politics: The Aztecs and Their Empire (also ANTHR/ARKEO 7268, ARKEO 4268)]

Spring. 4 credits. Next offered 2011–2012. J. Henderson.]

[ANTHR 4270 Political Economy in Archaeology (also ANTHR/ARKEO 7270, ARKEO 4270) # (SBA-AS)]

Fall. 4 credits. Next offered 2011–2012. K. Jordan.]

ANTHR 4272 Historical Archaeology of Indigenous Peoples (also AMST 6272, ANTHR/ARKEO 7272, ARKEO/AMST 4272) # (HA-AS)]

Fall. 4 credits. K. Jordan.

This seminar uses archaeology to examine the responses of nonstate indigenous peoples across the world to European expansion and colonialism over the past 500 years.

Archaeology provides a perspective on indigenous lives that both supplements and challenges document-based histories. We will assess the strengths and weaknesses of various theories of culture contact, and explore a series of archaeological case studies, using examples primarily from North America with lesser emphasis on Africa and the Pacific. The seminar provides a comparative perspective on indigenous-colonial relationships, in particular exploring the hard-fought spaces of relative autonomy created and sustained by indigenous peoples.

[ANTHR 4294 Seminar in Archaeology: The Archaeology of Human Origins (also ARKEO 4294) (HA-AS)]

Spring. 4 credits. T. Volman.

An exploration of the archaeological record associated with early modern and near-modern humans as well as their nonmodern contemporaries, such as the Neanderthals. Major issues include: what behaviors and capabilities are indicated for various populations, and how and why did these change over the course of the later Pleistocene? To what extent does the archaeological record support the "Out-of-Africa" hypothesis of a recent, African origin for all modern humans?]

IV. Biological Anthropology

Biological anthropology is the subfield of anthropology that explores the physical diversity, evolutionary history, and behavioral potential of our species. Consistent with anthropology more generally, biological anthropology is concerned with human variation. The distinctive perspective of this subfield is that it examines human variation within the framework of evolutionary theory. Analyses of both biology and culture, and of the interaction between the two, mark the broad boundaries of this discipline. Within that wide scope, specific areas of inquiry are diverse, including fossil studies, primate behavior, nutrition and development, sexual behavior, parental investment, molecular and population genetics, adaptation to environmental stress, disease evolution, life history analysis, and more. Some of the most

pressing social issues of our time fall within the domain of biological anthropology as well as a range of professions: the controversy over evolution and intelligent design; race, gender, and genetic determinism; the control of disease; the roots of aggression; and conservation and the role of humans in ecological systems. Although the number of Anthropology courses offered in this subfield are limited, students can pursue their interests through a variety of related courses in other departments and by constructing independent study courses with specific faculty members.

ANTHR 1300 Human Evolution: Genes, Behavior, and the Fossil Record (PBS Supplementary List)

Spring. 3 credits. Lab usage and maintenance fee: \$5. A. Arcadi.

For description, see Introductory Courses.

ANTHR 1401 The Scope of Anthropology

Fall. 1 credit. Staff.

For description, see Introductory Courses.

ANTHR 2750 Human Biology and Evolution (also NS 2750)

Fall. 3 credits. J. D. Haas.

For description, see NS 2750.

ANTHR 3000 Introduction to Anthropological Theory (CA-AS)

Fall. 4 credits. P. Nadasdy.

For description, see Sociocultural Anthropology.

ANTHR 3302 Anthropology of Everyday Life @ (SBA-AS)

Fall. 4 credits. M. Small.

How can a subject as esoteric as anthropology affect our daily lives? This course will cover 14 individual subjects such as love, sex, competition, anger, war, self-deceit, marriage, work, play and look at them anthropologically, that is, from an evolutionary and cross-cultural viewpoint. Students will also be required to integrate their own experience and observation of with these subjects and demonstrate how their behavior, too, has an anthropological bent.

[ANTHR 3305 Anthropology of Parenting @ (SBA-AS)]

Spring. 4 credits. Next offered 2010-2011. M. Small.]

ANTHR 3390 Primate Behavior and Ecology (PBS Supplementary List)

Spring. 4 credits. Comparative survey.

Prerequisite: ANTHR 1300 or permission of instructor. A. Clark Arcadi.

The course will investigate all aspects of nonhuman primate life. Based on the fundamentals of evolutionary theory, group and inter-individual behaviors will be presented. In addition, an understanding of group structure and breeding systems will be reached through an evaluation of ecological constraints imposed on primates in different habitats. Subjects include: primate taxonomy, diet and foraging, predation, cooperation and competition, social ontogeny, kinship, and mating strategies.

ANTHR 4390 Topics in Biological Anthropology

Fall. 4 credits. Prerequisites: ANTHR 1300, 3390, or permission of instructor. M. Small.

Current topics in biological anthropology are explored. Topics change each semester. For further information, contact the professor or department office.

V. Honors, Field Research, and Independent Study

ANTHR 4910 Independent Study: Undergrad I

Fall or spring. Credit TBA. Prerequisite: undergraduate standing. Staff.

Independent reading course in topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

ANTHR 4920 Independent Study: Undergrad II

Fall or spring. Credit and times TBA.

Prerequisite: undergraduate standing. Staff.

For description, see ANTHR 4910, section II, "Honors and Independent Study."

ANTHR 4983 Honors Thesis Research

Fall. 3 credits. Prerequisite: permission of Honors Committee. Staff.

Research work supervised by the thesis advisor, concentrating on determination of the major issues to be addressed by the thesis, preparation of literature reviews, analysis of data, and the like. The thesis advisor will assign the grade for this course.

ANTHR 4984 Honors Thesis Write-Up

Spring. 2 credits. Staff.

Final write-up of the thesis under the direct supervision of the thesis advisor, who will assign the grade for this course.

ANTHR 4991 Honors Workshop I Write-Up

Fall. 1 credit. Staff.

Course will consist of several mandatory meetings of all thesis writers with the honors chair. These sessions will inform students about the standard thesis production timetable, format and content expectations, and deadlines; expose students to standard reference sources; and introduce students to each other's projects. The chair of the Honors Committee will assign the grade for this course.

ANTHR 4992 Honors Workshop II

Spring. 2 credits. Staff.

Course will consist of weekly, seminar-style meetings of all thesis writers until mid-semester, under the direction of the honors chair. This second semester concentrates on preparation of a full draft of the thesis by mid-semester, with ample time left for revisions prior to submission. Group meetings will concentrate on collective reviewing of the work of other students, presentation of research, and the like.

Relevant courses in other departments

MUSIC 1302 Introduction to World Music II: Asia

Spring. 3 credits. M. Hatch.

MUSIC 1341 Gamelan in Indonesian History and Cultures

Fall and spring. 3 credits. Prerequisite: permission of instructor. M. Hatch.

BSOC/HD/NS 3470 Human Growth and Development: Biological and Behavioral Interactions

Spring. 3 credits. J. Haas and S. Robertson.

NS 6300 Anthropometric Assessment

Spring. 1 credit. J. Haas.

VI. Graduate Seminars

The graduate program in anthropology is described in much greater detail on the anthropology department web page at falcon.arts.cornell.edu/Anthro. The seminars described immediately below pertain to the program in sociocultural anthropology. For information about graduate study in archaeology and biological anthropology, see the anthropology department web page.

A core set of seminars is required of all graduate students in sociocultural anthropology: ANTHR 6000 and 6010. ANTHR 6403 is strongly recommended. These courses are open to graduate students from other related fields. This sequence, and the graduate curriculum in general, is premised on the idea that anthropology is best defined as the comparative study of human social life. This definition resists institutional pressures in the academy to distinguish social science from humanistic or cultural studies and scholarly from more worldly applications. Our most important method, ethnography, is at once scientific and humanistic; disciplinary aspirations refuse to view cultural interpretation and analytic explanation as separable values. Furthermore, theory in anthropology is directly related to practice in the world whether in relation to research or more action-oriented pursuits. Consequently, the core sequences as well as most other courses for graduate students are oriented explicitly toward subverting an ideological construction of social life as separable into cultural and social (or political-economic) domains.

ANTHR 6000 Proseminar: Culture and Symbol

Fall. 6 credits. H. Miyazaki.

Focuses on an appreciation of symbolic, expressive, and representational forms and processes both as producers and products of social activities. Through the study of symbolic anthropology, structuralism, exchange, myth and ritual, religion, gender, personhood, linguistics, semiology, etc., the course investigates how identity and meaning are linked to the practical exigencies of social life. While emphasizing aspects of the discipline generally associated with cultural anthropology, the course endeavors to set the stage for a dialectical understanding of social, political, economic, and symbolic activities as interrelated phenomena. The works of de Saussure, Levi-Strauss, Dumont, Geertz, Victor Turner, Sahlins, among others, as well as contemporary theories are given careful attention.

ANTHR 6010 Proseminar: Social Organization

Spring. 6 credits. M. Welker.

Focuses on linkages between culture and social institutions, representations and practices. The nature of these linkages is debated from strongly contesting points of view in social theory (structuralist, poststructuralist, utilitarian, hermeneutic, Marxist). Unlike debates in critical theory where the form of contestation has been mainly philosophical, in anthropology, these issues have developed in ethnographic analyses. The course briefly surveys kinship theory and economic anthropology with a focus on implications for general issues in social theory. Discussion of attempts to develop dialectical syntheses around the motion of "practice" follows. The issues addressed in this section carry over into the

next, colonialism and post-colonialism, in which poststructuralist readings of history are counterposed to Marxist ones. Finally, Lacanian and Marxist visions of ideology as they relate to anthropological theory and ethnographic analysis are examined with particular emphasis on the cultural and social production of persons.

[ANTHR 6248 Iroquois Archaeology (also ANTHR 3248, ARKEO/AIS 3248/6248)]

Fall. 4 credits. Next offered 2011–2012.
K. Jordan.]

ANTHR 6256 Maya History (also ARKEO 6256)

Fall. 4 credits. J. Henderson.
An exploration of Maya understandings of their own history, drawing on ethnographic, historical, and archaeological sources. Analysis of hieroglyphic inscriptions from ancient Maya cities is a major focus.

[ANTHR 6258 Archaeological Analysis (also ANTHR 4258, ARKEO 4258/6258)]

Spring. 4 credits. Next offered 2011–2012.
J. Henderson.]

[ANTHR 6269 Gender and Age in Archaeology (also ANTHR/ARKEO 3269, ARKEO 6269, FGSS 6700)]

Fall. 4 credits. Next offered 2010–2011.
N. Russell.]

ANTHR 6270 Environmental Archaeology (also ANTHR 3720, ARKEO 3270/6270)

Fall. 4 credits. T. Volman.
For description, see ANTHR 3720.

ANTHR 6272 Hunters/Gatherers Past/ Present (also ANTHR 3272, ARKEO 3272/6272)

Fall. 4 credits. T. Volman.
For description, see ANTHR 3272.

[ANTHR 6371 Palaeoanthropology of South Asia (also ASIAN 6671, BIOEE 6710)]

Fall. 3 credits. Next offered 2011–2012.
K. A. R. Kennedy.]

[ANTHR 6373 Human Evolution: Concepts, History, and Theory (also BIOEE 6730)]

Fall. 3 credits. Prerequisite: one year introductory biology, ANTHR 1300, or permission of instructor. Offered alternate years. Next offered 2011–2012.
K. A. R. Kennedy.]

[ANTHR 6403 Ethnographic Field Methods (also ANTHR 4403)]

Fall. 4 credits. Next offered 2010–2011.
V. Santiago-Irizarry.]

[ANTHR 6421 Gender and Culture (also FGSS 6310)]

Fall. 4 credits. Next offered 2011–2012.
K. March.]

ANTHR 6422 Culture, Politics, and Environment in the Circumpolar North (also ANTHR 3422)

Spring. 4 credits. P. Nadasdy.
For description, see ANTHR 3422.

[ANTHR 6424 Ethnoracial Identity in Anthropology, Language, and Law (also AMST/LSP 6424)]

Spring. 4 credits. Next offered 2011–2012.
V. Santiago-Irizarry.]

ANTHR 6430 Concepts and Categories in Theory and Practice

Fall. 4 credits. P. Nadasdy.

Concepts and categories form the basis of much human thought and action, and anthropologists have long been fascinated by how humans categorize the world. Yet, concepts and categories shape anthropological thought and practice as well. The conceptual tools we bring to bear in the study of sociocultural phenomena profoundly shape our understandings of them. Despite this, however, many of the concepts and categories that anthropologists and other social scientists use are implicit in their work rather than consciously theorized. The goal of this course is to make students aware of the role that concepts and categories play in the practice of social science and to provide them with the theoretical tools needed to evaluate conceptual frameworks in the social sciences.

ANTHR 6440 Research Design

Spring. 4 credits. K. March.

This seminar focuses on preparing a full-scale proposal for anthropological fieldwork for a dissertation. Topics include identifying of appropriate funding sources; defining a researchable problem; selecting and justifying a particular fieldwork site; situating the ethnographic case within appropriate theoretical contexts; selecting and justifying appropriate research methodologies; developing a feasible timetable for field research; ethical considerations and human subjects protection procedures; and preparing appropriate budgets. This is a writing seminar, and students will complete a proposal suitable for submission to a major funding agency in the social sciences.

[ANTHR 6450 Social Studies of Economics and Finance]

Fall. 4 credits. Next offered 2011–2012.
H. Miyazaki.]

[ANTHR 6452 Evidence: Ethnography and Historical Method]

Fall. 4 credits. Next offered 2012–2013.
H. Miyazaki.]

[ANTHR 6461 Anthropology of Organizations (also ANTHR 3461)]

Spring. 4 credits. D. Greenwood. Next offered 2010–2011.]

[ANTHR 6462 Democratizing Research (also ANTHR 3462)]

Fall. 4 credits. D. Greenwood. Next offered 2010–2011.]

ANTHR 6465 Anthropology of the Body (also ANTHR 3465)

Fall. 4 credits. S. Langwick.
For description, see ANTHR 3465.

[ANTHR 6479 Technocracy: Anthropological Approaches]

Spring. 4 credits. Next offered 2011–2012.
A. Riles.]

[ANTHR 6480 Anthropology and Globalization (also ANTHR 4480)]

Fall. 4 credits. Next offered 2011–2012.
Staff.]

[ANTHR 6482 Perspectives on the Nation]

Spring. 4 credits. Next offered 2011–2012.
V. Munasinghe.]

[ANTHR 6542 Violence, Symbolic Violence, Terror and Trauma in South Asia and the Himalayas (also ANTHR 4542)]

Fall. 4 credits. Next offered 2011–2012.
D. Holmberg.]

ANTHR 6543 Chinese Ethnology

Fall. 4 credits. S. Sangren and M. Fiskesjo.
This seminar is designed for graduate students specializing in the study of Chinese culture and society and for advanced undergraduates who plan to pursue careers in the academic study of Chinese culture. The course focuses on close readings on theoretical and conceptual problems and issues in the study of Chinese culture and society, with an emphasis on perspectives provided by cultural anthropology. Among topics that may be included are the social production of gender, ideology in myth and ritual, the cultural uses of history, and political culture; however, the particular emphases of the seminar may vary from year to year. Those with a reading knowledge of Chinese will be encouraged to explore Chinese sources, but use of such sources is not a requirement of the course.

ANTHR 7000 Development of Anthropological Thought (also ANTHR 4000)

Fall. 4 credits. Staff.
For description, see ANTHR 4000.

[ANTHR 7262 Catalhoyuk and Archaeological Practice (also ANTHR 4262/)]

Spring. 4 credits. Next offered 2011–2012.
N. Russell.]

[ANTHR 7268 Myth, History, and Politics: The Aztecs and Their Empire (also ANTHR/ARKEO 4268, ARKEO 7268)]

Spring. 4 credits. Next offered 2011–2012.
J. Henderson.]

[ANTHR 7270 Political Economy in Archaeology (also ANTHR 4270, ARKEO 4270/7270)]

Fall. 4 credits. Next offered 2011–2012.
K. Jordan.]

ANTHR 7272 Historical Archaeology of Indigenous Peoples (also AMST 6272, AMST/ARKEO 4272, ARKEO 7272)

Fall. 4 credits. K. Jordan.
For description, see ANTHR 4272.

ANTHR 7419 Anthropology of Corporations (also ANTHR 4419)

Spring. 4 credits. M. Welker.
For description, see ANTHR 4419.

ANTHR 7426 Ideology and Social Production (also ANTHR 4426)

Spring. 4 credits. S. Sangren.
For description, see ANTHR 4426.

ANTHR 7429 Anthropology and Psychoanalysis (also ANTHR 4429)

Fall. 4 credits. S. Sangren.
For description, see ANTHR 4429.

[ANTHR 7437 Anthropology of Development (also ANTHR 4437)]

Fall. 4 credits. Next offered 2010–2011.
M. Welker.]

[ANTHR 7444 God(s) and the Market (also ANTHR 4444)]

Spring. 4 credits. Next offered 2012–2013.
H. Miyazaki.]

ANTHR 7520 Southeast Asia: Readings in Special Problems

Fall or spring. Credit TBA. Staff.
Independent reading course on topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

ANTHR 7523 Making History on the Margins: The China-SE Asia Borderlands (also ANTHR 4523)

Fall. 4 credits. M. Fiskesjo.
For description, see ANTHR 4523.

ANTHR 7530 South Asia: Readings in Special Problems

Fall or spring. Credit TBA. Staff.
Independent reading course in topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

ANTHR 7545 Peoples and Cultures of the Himalayas (also ANTHR 3545)

Fall. 4 credits. K. March.
For description, see ANTHR 3545.

ANTHR 7550 East Asia: Readings in Special Problems

Fall or spring. Credit TBA. Staff.
Independent reading course in topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

ANTHR 7910 Independent Study: Grad I

Fall or spring. Credit TBA. Prerequisite: graduate standing. Staff.
Independent reading course in topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

ANTHR 7920 Independent Study: Grad II

Fall or spring. Credit TBA. Prerequisite: graduate standing. Staff.

For description, see ANTHR 7910.

ANTHR 7930 Independent Study: Grad III

Fall or spring. Credit TBA. Prerequisite: graduate standing. Staff.

For description, see ANTHR 7910.

ARABIC AND ARAMAIC

See "Department of Near Eastern Studies."

ARCHAEOLOGY

S. Baugher, director (Landscape Architecture), K. M. Clinton, director of graduate studies (Classics), A. Alexandridis (History of Art), K. Bowes (Classics), J. E. Coleman (Classics), M. Fiskesjo (anthropology), F. Gleach (Anthropology), K. L. Gleason (Landscape Architecture), J. S. Henderson (Anthropology), K. Jordan (Anthropology), K. A. R. Kennedy (Ecology and Evolutionary Biology), S. Manning (Classics), R. McNeal (Asian Studies), C. Monroe (Near Eastern Studies), L. Monroe (Near Eastern Studies), D. I. Owen (Near Eastern Studies), A. Ramage (History of Art), E. Rebillard (Classics), N. Russell (Anthropology), B. S. Strauss (History), M. A. Tomlan (City and Regional Planning), T. P. Volman, director of undergraduate studies (Anthropology), J. R. Zorn (Near Eastern Studies).

Archaeology is an interdisciplinary field at Cornell, which is one of the few universities in the United States to offer a separate archaeology major and a master's degree. Program faculty members, affiliated with several departments, coordinate course offerings and help students identify

opportunities for fieldwork, graduate study, and professional positions.

The Major

Prospective majors must complete ARKEO 1200 or one of the basic courses as defined below before they will be admitted to the major.

Because the major draws on the teaching and research interests of faculty from many departments to present a broad view of the archaeological process, interested students should discuss their course of study with a participating faculty member as early as possible. In some areas of specialization, intensive language training should be coordinated with other studies as early as the freshman year.

Once admitted to the major, students must take at least 32 additional credits from the courses listed below, or from related fields selected in consultation with a major advisor of their choosing. The courses chosen should provide exposure to a broad range of cultures known through archaeology and the methods of uncovering and interpreting them. Sixteen of the credit hours should be at the 3000 level or above. At least two courses must be taken from each of the following categories: II. Anthropological Archaeology; III. Classical, Near Eastern, and Medieval Archaeology; and IV. Methodology and Technology. Only 4 credits of ARKEO 3000 Individual Study or other supervised study can count toward the major.

Courses basic to the discipline of archaeology are marked with the word "Basic" after the number of credit hours. It is recommended that majors who are planning to pursue graduate studies in archaeology take at least two of the basic courses in each category. Further courses in languages and geology are also recommended.

Honors. Honors in archaeology are awarded on the basis of the quality of an honors essay and the student's overall academic record. Prospective honors students should have at least a 3.5 GPA in the major and a 3.0 grade point average overall. They should consult with the director of undergraduate studies by the beginning of the senior year. The honors essay is normally prepared over two semesters in consultation with a faculty advisor during the senior year. Students may enroll in ARKEO 4981 Honors Thesis Research, and to complete the thesis, they may enroll in ARKEO 4982 Honors Thesis Writeup. Both courses are offered in the fall and spring. Only ARKEO 4981 may count toward hours for completion of the archaeology major requirements. The credit hours for these courses are variable.

Fieldwork. Every student should gain some practical experience in archaeological fieldwork on a project authorized by his or her advisor. This requirement may be waived in exceptional circumstances. The Jacob and Hedwig Hirsch bequest provides support for a limited number of students to work at excavations sponsored by Cornell and other approved institutions.

The Minor

Students in Cornell schools and colleges other than Arts and Sciences may elect a minor in archaeology. To minor in archaeology, the student must complete five courses, all with a grade of C or better. The five courses must consist of either (1) ARKEO 1200 and four other courses from categories II-IV (described

above), at least three of which must be basic courses, or (2) five courses from categories II-IV, at least four of which must be basic courses. Minors are encouraged to gain some fieldwork experience. They are eligible for Hirsch Scholarships in support of fieldwork on the same basis as majors.

First-Year Writing Seminars

For course descriptions, see the First-Year Writing Program brochure.

I. Introductory Courses and Independent Study Courses

ARKEO 1200 Ancient Peoples and Places (also ANTHR 1200) # @ (HA-AS)

Spring. 3 credits. Basic. F. Gleach.
Broad introduction to archaeology: the study of material remains to answer questions about the human past. Case studies highlight the variability of ancient societies and illustrate the varied methods and interpretive frameworks archaeologists use to reconstruct them. This course can serve as a platform for both archaeology and anthropology undergraduate majors.

ARKEO 3000 Individual Study in Archaeology and Related Fields

Fall and spring. Credit TBA. Prerequisite: ARKEO 1200 or permission of instructor.
Undergraduate students pursue topics of particular interest under the guidance of a faculty member.

ARKEO 4981 Honors Thesis Research

Fall or spring. 4 credits, variable.
Prerequisite: admission to honors program.
Independent work under the close guidance of a faculty member.

ARKEO 4982 Honors Thesis Writeup

Fall or spring. 4 credits, variable.

ARKEO 6000 Special Topics in Archaeology

Fall and spring. 4 credits, variable.
Graduate students pursue advanced topics of particular interest under the guidance of a faculty member(s).

ARKEO 8901-8902 Master's Thesis

8901, fall; 8902, spring. 4 credits, variable.
Prerequisite: master's students in archaeology. S-U grades only.
Students, working individually with faculty member(s), prepare a master's thesis in archaeology.

II. Anthropological Archaeology

ARKEO 2200 Early People: The Archaeological and Fossil Record (also ANTHR 2200) # (HA-AS)

Spring. 3 credits. Basic. T. P. Volman.
For description, see ANTHR 2200.

ARKEO 2201 Early Agriculture (also ANTHR 2201) @ # (HA-AS)

Spring. 3 credits. Basic. N. Russell.
For description, see ANTHR 2201.

[ARKEO 2215 Stone Age Art (also ANTHR 2215) # (CA-AS)]

Fall. 3 credits. Basic. Next offered 2010-2011. T. P. Volman.]

ARKEO 2235 Archaeology of North American Indians (also AIS/AMST 2350, ANTHR 2235) # (HA-AS)

Spring. 3 credits. Basic. K. Jordan.
For description, see ANTHR 2235.

[ARKEO 3217 Stone Age Archaeology (also ANTHR 3217) (HA-AS)]

Fall. 4 credits. Basic. Next offered 2010–2011. T. P. Volman.]

[ARKEO 3230 Humans and Animals (also ANTHR 3230) @ # (CA-AS)]

Fall. 4 credits. Next offered 2010–2011. N. Russell.]

[ARKEO 3232 Politics of the Past (also ANTHR 3232) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011. N. Russell.]

[ARKEO 3248 Iroquois Archaeology (also AIS 3428/6428, AMST/ANTHR/ARKEO 6248) # (HA-AS)]

Fall. 4 credits. Next offered 2011–2012. K. Jordan.]

[ARKEO 3255 Ancient Mexico and Central America (also ANTHR 3255) @ # (HA-AS)]

Fall. 4 credits. Basic. Next offered 2010–2011. J. Henderson.]

ARKEO 3256 Archaeology of the Andes (also ANTHR/LATA 3256) @ # (HA-AS)]

Fall. 4 credits. Basic. J. Henderson. For description, see ANTHR 3256.

[ARKEO 3269 Gender and Age in Archaeology (also ANTHR 3269/6269, FGSS 3700/6700) (SBA-AS)]

Fall. 4 credits. Next offered 2010–2011. N. Russell.]

ARKEO 3272 Hunters and Gatherers (also ANTHR 3272/6272, ARKEO 6272) @ # (SBA-AS)]

Fall. 4 credits. T. Volman. For description, see ANTHR 3272.

[ARKEO 3600 Preindustrial Cities and Towns in North America (also LA 3600, CRP 3600)]

Spring. 3 credits. Next offered 2010–2011. S. Baugher.]

[ARKEO 4256 Mesoamerican Religion, Science, and History (also ANTHR 4256) @ # (CA-AS)]

Spring. 4 credits. Next offered 2010–2011. J. Henderson.]

[ARKEO 4262 Cataloyuk and Archaeological Practice (also ANTHR 4262, ARKEO/ANTHR 7262) @ # (HA-AS)]

Spring. 4 credits. Next offered 2011–2012. N. Russell.]

[ARKEO 4268 Myth, History, and Politics: the Aztecs and their Empire (also ANTHR 4268, ARKEO/ANTHR 7268)]

Spring. 4 credits. Next offered 2011–2012. J. Henderson.]

[ARKEO 4270 Political Economy in Archaeology (also ANTHR 4270, ARKEO/ANTHR 7270) # (SBA-AS)]

Fall. 4 credits. Next offered 2011–2012. K. Jordan.]

ARKEO 4272 Historical Archaeology of Indigenous Peoples (also AIS 4270, AMST 4272, ANTHR/ARKEO 4272/7272) # (HA-AS)]

Fall. 4 credits. K. Jordan. For description, see ANTHR 4272.

ARKEO 4294 Seminar in Archaeology: The Archaeology of Human Origins (also ANTHR 4294) (HA-AS)]

Spring. 4 credits. T. P. Volman. For description, see ANTHR 4294.

[ARKEO 6248 Iroquois Archaeology (also AIS 3480/6480, AMST 6248, ANTHR 3248/6248, ARKEO 3248)]

Fall. 4 credits. Next offered 2011–2012. K. Jordan.]

ARKEO 6256 Maya History (also ANTHR 6256)]

Fall. 4 credits. J. Henderson. For description, see ANTHR 6256.

[ARKEO 6269 Gender and Age in Archaeology (also ANTHR 3269/6269, ARKEO 3269, FGSS 3700/6700)]

Fall. 4 credits. Next offered 2010–2011. N. Russell.]

[ARKEO 7268 Myth, History, and Politics: the Aztecs and their Empire (also ANTHR 7268, ARKEO/ANTHR 4268)]

Spring. 4 credits. Next offered 2011–2012. J. Henderson. For description, see ANTHR 4268.]

[ARKEO 7270 Political Economy in Archaeology (also ANTHR 4270/7270, ARKEO 4270)]

Fall. 4 credits. Next offered 2011–2012. K. Jordan.]

ARKEO 7272 Historical Archaeology of Indigenous Peoples (also AIS 7720, AMST 4272/6272, ANTHR 4272/7272, ARKEO 4272)]

Fall. 4 credits. K. Jordan. For description, see ANTHR 4272.

III. Classical, Near Eastern, and Medieval Archaeology**ARKEO 2661 Ships and Seafaring—Intro to Nautical Archaeology (also JWST/NES 2661) @ # (HA-AS)]**

Fall. 3 credits. Basic. C. Monroe. For description, see NES 2661.

ARKEO 2668 Ancient Egyptian Civilization (also JWST/NES 2668) @ # (HA-AS)]

Spring. 3 credits. Basic. C. Monroe. For description, see NES 2668.

CLASS 2700 Introduction to Art History: The Classical World (also ARTH 2200) # (HA-AS)]

Fall. 4 credits. Basic. K. McDonnell. For description, see CLASS 2700.

[ARKEO 2728 Art and Archeology of the Ancient Mediterranean World (also ARTH 2227, CLASS 2727) # (HA-AS)]

Fall. 4 credits. Next offered 2011–2012. S. Manning.]

[ARKEO 2743 Archaeology/Roman Private Life (also ARTH 2221, CLASS 2743) # (CA-AS)]

Spring. 3 credits. Next offered 2011–2012. A. Alexandridis.]

ARKEO 2744 Archaeology of Greek Private Life (also CLASS/HIST 2744, ARTH 2222) # (CA-AS)]

Spring. 3 credits. K. Bowes. For description, see CLASS 2744.

ARKEO 3588 Archaeology of the Lands of the Bible (also NES/JWST 3588)]

Spring. 4 credits. L. Monroe. For description, see NES 3588.

[ARKEO 3661 Sumerian Language and Culture I (also JWST/NES 3661) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011. D. Owen.]

[ARKEO 3665 Ancient Iraq II: 2000–331 BCE (also NES 3665) (HA-AS)]

Fall. 4 credits. Next offered 2010–2011. D. Owen.]

[ARKEO 3666 History and Archaeology of the Ancient Near East (also ARKEO/JWST/NES 3666/6666) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011. D. Owen. For description, see NES 3666.]

[ARKEO 3730 Archaeology, Ethics, and Nationalism (also CLASS 3730, HIST 3630) # (CA-AS)]

Spring. 3 credits. Next offered 2010–2011. K. Bowes.]

[ARKEO 3731 Archaeology/Ancient Mediterranean Religion (also CLASS 3731) # (HA-AS)]

Fall. 4 credits. Next offered 2011–2012. K. Bowes. For description, see CLASS 3731.]

ARKEO 3800 Introduction to the Arts of China (also ARTH 3800) @ # (LA-AS)]

Fall. 4 credits. A. Pan. For description, see ARTH 3800.

[ARKEO 4644 Late Bronze Age World of Ugarit (also ARKEO/JWST/NES 6644, JWST/NES 4644)]

Spring. 4 credits. Next offered 2010–2011. C. Monroe.]

[ARKEO 6644 Late Bronze Age World of Ugarit (also ARKEO/JWST/NES 4644, NES/JWST 6644)]

Spring. 4 credits. Next offered 2010–2011. C. Monroe.]

[ARKEO 6666 History and Archaeology of the Ancient Near East (also ARKEO/JWST/NES 3666, JWST/NES 6666)]

Fall. 4 credits. Next offered 2010–2011. D. Owen.]

ARKEO 7729 Emergence of Greek Civilization (also CLASS 7729)]

Spring. 4 credits. S. Manning. For description, see CLASS 7729.

LA 5450 The Parks and Fora of Imperial Rome

Spring. 3 credits. Prerequisites: advanced standing in design field, classics, or history of art, or permission of instructor. K. Gleason.

IV. Methodology and Technology**ARKEO 2220 Field Course in Iroquois Archaeology (also ANTHR 2220) (SBA-AS)]**

Summer only. 3 credits. K. Jordan. For description, see ANTHR 2220.

[ARKEO 2728 Art and Archaeology in the Ancient Mediterranean World (also ARTH 2227, CLASS 2727)]

Fall. 4 credits. Basic. Next offered 2010–2011. S. Manning.]

[ARKEO 2756 Practical Archaeology (also CLASS 2756)]

ARKEO 2610 Urban Archaeology (also CRP/LA 2610)

Fall. 3 credits. Basic. S. Baugher.
For description, see LA 2610.

ARKEO 2620 Laboratory in Landscape Archaeology (also LA 2620)

Spring. 3 credits. Basic. S. Baugher.
For description, see LA 2620.

ARKEO 3002 Archaeology Underwater

Summer only. 2 credits. Off campus at Shoals Marine Lab. N. Brady.
This course outlines the development of maritime archaeology as it has emerged from more traditional terrestrial archaeology and the still-young discipline of underwater archaeology. As its primary examples, the course focuses on the archaeology of the Isles of Shoals within the Gulf of Maine; it also conducts onsite survey and site investigations to create an in-depth archaeological and historical study of the isles. Students participate in active fieldwork, including foreshore study and underwater exploration.

ARKEO 3003 Island Archaeology

Summer only. 2 credits. Off campus at Shoals Marine Lab. N. Hamilton.
The objective of this course will be to train students in standardized and innovative methods and technology used in archaeological surveys, excavations, assessments, research, and compliance work. Course work will include documentation, reporting, and completion of architectural, historic, and prehistoric site survey and excavation forms suitable for historic reservation submission. Students will be able to develop research designs and strategies for Phase I, II, and III archaeological investigations. Field logistics, scheduling, ethics, public relations, and personnel-management training will be included. The Register of Professional Archaeology standards and practice will be used as a guide.

ARKEO 3090 Introduction to Dendrochronology (also ARTH 3250, CLASS 3750) # (HA-AS)

Fall. 4 credits. Limited to 10 students.
Prerequisite: permission of instructor. Letter grades only. S. Manning.
For description, see CLASS 3750.

ARKEO 3270 Environmental Archaeology (also ANTHR 3270/6270, ARKEO 6270) (PBS Supplementary List)

Fall. 4 credits. T. P. Volman.
For description, see ANTHR 3270.

[ARKEO 4020 Designing Archaeological Exhibits (also ARKEO 6020)

Fall. Variable credit. Letter grades only.
Next offered 2010-2011. S. Baugher.]

[ARKEO 4258 Archaeological Analysis (also ANTHR 4258/6258, ARKEO 6258) (SBA-AS)

Spring. 4 credits. Limited to 15 students.
Prerequisite: archaeology course or permission of instructor. Next offered 2011-2012. J. S. Henderson.]

[ARKEO 4260 Field and Analytical Methods in Archaeology (also ANTHR 4260) # (SBA-AS)

Spring. 4 or 6 credits. Next offered 2011-2012. K. Jordan.]

ARKEO 4263 Zooarchaeological Method (also ANTHR 4263) (PBS Supplementary List)

Fall. 5 credits. N. Russell.
For description, see ANTHR 4263.

ARKEO 4264 Zooarchaeological Interpretation (also ANTHR 4264) (PBS Supplementary List)

Spring. 4 credits. Prerequisites: ANTHR/ARKEO 4263; permission of instructor.
N. Russell.
For description, see ANTHR 4264.

[ARKEO 4267 Origins of Agriculture (also ANTHR 4267) # (HA-AS)

Spring. 4 credits. Next offered 2010-2011.
N. Russell.]

ARKEO 4370 Geophysical Field Methods (also EAS 4370) (PBS)

Fall. 3 credits. Prerequisite: PHYS 2213 or 2208 or permission of instructor.
L. D. Brown.
For description, see EAS 4370.

ARKEO 4600 Late Quaternary Paleocology (also EAS 4600) (PBS)

Fall. 4 credits. M. Goman.
For description, see EAS 4600.

[ARKEO 4903 Methods in the Study of the Ancient Near East (also JWST/NES 4903)

Spring. 4 credits. Next offered 2010-2011.
D. Owen.
For description, see NES 4903.]

ARKEO 6000 Special Topics in Archaeology

Fall and spring. 4 credits. Staff.

[ARKEO 6020 Designing Archaeological Exhibits (also ARKEO 4020)

Spring. Variable credit. Letter grades only.
Next offered 2010. S. Baugher.]

ARKEO 6270 Environmental Archaeology (also ANTHR 3270/6270, ARKEO 3270)

Fall. 4 credits. T. P. Volman.
For description, see ANTHR 3270.

ARKEO 6510 Advanced Fieldwork in Historical Archaeology (also ARKEO 4510)

Fall. 4 credits. S. Baugher.

ARKEO 6520 Advanced Laboratory in Historical Archaeology (also ARKEO 4520)

Spring. 3 credits. S. Baugher.
This is a course for archaeology majors and minors who want to obtain more in-depth skills in laboratory work, identification and cataloguing of historic period ceramics, glass, and metal. The course will provide the students with skills to undertake laboratory analysis of artifacts. Students will undertake independent research projects on specific artifacts (in lieu of a term paper).

[ARKEO 7742 Research Methods in Archaeology (also CLASS 7742)

Spring. 4 credits. S. Manning. Next offered 2010-2011.]

[BIOEE 6710 Paleoanthropology of South Asia (also ANTHR 6371, ASIAN 6672)

Fall. 3 credits. Next offered 2011-2012.
K. A. R. Kennedy.]

V. Relevant Courses at Ithaca College

Contact Sherene Baugher in Landscape Architecture at sbb8@cornell.edu or the Ithaca College Anthropology Department at 274-1331 for further information or visit their web site at www.ithaca.edu/hs/anthro.

Prehistory of South America. M. Malpass.
Every other year.

New World Complex Societies. M. Malpass.
Irregular offering.

Archaeological Methods and Techniques.
M. Malpass. Fall 2008.

Archaeology of Colonial America. S. Stull. Fall 2008.

World Prehistory. J. Rossen. Every semester.

North American Prehistory. J. Rossen. Every year.

People, Plants, and Culture: Archaeobotany and Ethnobotany. J. Rossen. Every other year.

Seminar: Hunter-Gatherers. J. Rossen. Every other year.

Seminar: Origins of Agriculture. J. Rossen.
Every other year.

Ethnoarchaeology. J. Rossen. Every other year.

Archaeological Field School.

ASIAN STUDIES

R. McNeal, chair (350 Rockefeller Hall, 255-5095); A. Blackburn, B. Bledsoe, D. Boucher, T. Chalomentiarana, M. Chapman, B. de Bary, S. Divo, W. George, D. Gold, G. Green, E. Gunn, B. Herath, H. Huang, S. Ichikawa, N. Jagacinski, J. Kanemitsu, Y. Katagiri, N. Larson, J. M. Law, L. McCrear, D. McKee, Y. Lee-Mehta, S. Mukherjee, S. Oja, J. Pandin, L. Paterson, H. Phan, B. Rusk, N. Sakai, T. Savella, W. Shao, S. Singh, M. Song, R. Sukle, M. Suzuki, K. Taylor, Q. Teng, T. Tranviet, S. Tun, D. X. Warner, L. Zheng; Emeritus: K. Brazell, T. L. Mei, J. Wolff; Associated Faculty: A. Carlson, J. Chen, Z. Chen, S. Cochran, A. Cohn, M. Fiskesjo, M. Hatch, R. Herring, T. J. Hinrichs, K. Hirano, D. Holmberg, M. Katzenstein, K. Kennedy, V. Koschmann, T. Loos, T. Lyons, K. March, S. Martin, K. McGowan, H. Miyazaki, S. Mohanty, V. Munasinghe, V. Nee, A. Nussbaum, A. Pan, P. Sangren, J. Siegel, E. Tagliacozzo, N. Uphoff, J. Whitman, A. Willford

The Department of Asian Studies and associated faculty members in other departments encompass the study of East Asia, South Asia, and Southeast Asia and offer courses in most of the disciplines of the social sciences and the humanities. Over 40 faculty members specialize in topics arranged under our rubrics of "Literature and Linguistics," "Religion," and "Society and Culture," as well as offering more broad courses under our "General Education" heading. Asian Studies courses through the 4400 level (ASIAN is the prefix) are taught in English and are open to all students in the university. Some of these courses may be counted toward majors in other departments; others fulfill various distribution requirements.

The Major

To become an Asian Studies major, a student must first successfully complete with a minimum grade of B at least two Asia content courses (excluding writing seminars), one of which may be a language course. Applications to major in Asian Studies must be approved by the director of undergraduate studies.

Completion of the major requires completion of two years of an Asian language or the demonstration of equivalent proficiency. To demonstrate equivalent proficiency, a student with prior background in the language should attempt to test into a desired language course at the 2200 level or beyond. Completing two courses at the 2200 level, or the second semester of such a sequence (while testing out of the first semester), or testing into a language course beyond the 2200 level, serves to demonstrate proficiency. Once proficiency has been demonstrated, students may count up to 6 units of further language study among the 30 Asian Studies units required of departmental majors. These 30 units must be taken from courses numbered 2200 and above and including at least one from two of the Asian Studies categories of "Literature and Linguistics" (LL), "Religion" (RL), and "Society and Culture" (SC); at least one course at the 3300 level; and at least one course at the 4400 level or above. A minimum grade of B must be received in all of these courses. Courses taken for major credit must be taken for a grade rather than as S–U. Certain courses about Asia offered in other departments at the 1100 level may, at the discretion of the advisor and the DUS, be counted toward our major as if they were 2200-level courses, e.g., HIST/ASIAN 1191, 1192.

Category Key: Courses in Asian Studies are broken into different categories. To determine which category a course falls in, please note the reference at the end of each course description. The key is as follows: GE = General Education, LL = Literature and Linguistics, RL = Religion and SC = Society and Culture.

Honors

To be eligible for honors in Asian Studies, a student must have a cumulative GPA of 3.7 in all Asian Studies area courses and must successfully complete an honors essay during the senior year. Students who wish to be considered for honors should apply to the director of undergraduate studies during the second semester of their junior year. The application must include an outline of the proposed project and the endorsement of a supervisor chosen from the Asian Studies advising faculty. During the first term of the senior year, the student does research for the essay in conjunction with an appropriate Asian Studies course or ASIAN 4401. By the end of the first term, the student must present a detailed outline of the honors essay and have it approved by the project supervisor and the director of undergraduate studies. The student is then eligible for ASIAN 4402, the honors course, which entails the writing of the essay. At the end of the senior year, the student has an oral examination (with at least two faculty members) covering both the honors essay and the student's area of concentration.

Minor in East Asia Studies

A candidate for the bachelor of arts or science degree at Cornell may take a minor in East Asian studies by completing at least 18 units of course work in East Asian studies.

Students normally take five courses in East Asian Studies from those East Asian courses listed (China, Japan, Korea) either under Asian Studies or Asian-related courses taught outside of the Asian Studies department. Of these,

nonlanguage courses should be selected at the 2200 level or above. Two courses in an East Asian language at the 1100 level or above may be counted toward the minor. Language study is strongly encouraged. East Asian graduate courses may also be taken for the minor, as well as East Asia–related courses with a research paper on an East Asian topic. Appropriate courses taken through Cornell Abroad in East Asia may also be counted toward the minor. A minimum grade of B must be received for all courses counted toward the minor. S–U courses are ineligible. Students minoring in East Asian Studies should select an advisor from the East Asia Program faculty for consultation on their course of study. For more information, contact the Department of Asian Studies, 350 Rockefeller Hall, 255-5095, or lrc.cornell.edu/asian.

Minor in South Asia Studies

A candidate for the bachelor of arts or science degree at Cornell may achieve a minor in South Asia Studies by completing at least 18 units of course work (typically five courses) in South Asian Studies. These courses are selected from South Asia courses listed under the Department of Asian Studies, or from other Asia-related courses offered by other departments. Of these, nonlanguage courses should be selected at the 2200 level or above. Two courses in an South Asian language at the 1100 level or above may be counted toward the minor. Language study is strongly encouraged. Appropriate South Asia graduate course work may be included in the minor with consent of the instructor and the advisor. One South Asia–related course with a research paper on a South Asia subject may be included with the consent of the advisor and the director of undergraduate studies. A minimum grade of B must be received for all courses toward the Minor. S–U courses are ineligible. Students minoring in South Asian Studies are considered members of the South Asia Program and will have an advisor from the program faculty. (This advisor will supervise a student's minor and does not substitute for a student's major advisor.) For more information, contact the Department of Asian Studies, 350 Rockefeller Hall, 255-5095, or lrc.cornell.edu/asian.

Minor in Southeast Asia Studies

A candidate for the bachelor of arts or science degree at Cornell may take a minor in Southeast Asian Studies by completing 18 units of course work, including a history course and 3 courses or seminars at the intermediate or advanced level. Up to 2 Southeast Asian language courses at the 1100 level or above may be included in the minor courses. A recommended plan would include ASIAN 2208 and 4 additional courses. A minimum grade of B must be received for all courses counted toward the minor. S–U courses are ineligible. Students taking a minor in Southeast Asian Studies are members of the Southeast Asia Program and will have an advisor from the Southeast Asia program faculty. Such students are encouraged to commence work on a Southeast Asian language either at the 10-week intensive courses offered by the Southeast Asia Studies Summer Institute (SEASSI) or by studying for a semester at IKIP Malang, Indonesia; Khon Kaen University, Thailand; or Hanoi University, Vietnam. Fellowships are available for undergraduates through the Cornell Abroad

Program. For more information, contact the Department of Asian Studies, 350 Rockefeller Hall, 255-5095, or lrc.cornell.edu/asian.

Intensive Language Program (FALCON)

The FALCON Program offers intensive instruction in either Japanese or Mandarin Chinese. Aside from the exclusive language schools of some government agencies, FALCON is the only program in the world that offers a full year of intensive instruction beginning at the elementary level and continuing through the advanced level. FALCON is a full-time program; the degree of intensity does not allow students to enroll simultaneously in other courses or to work, except perhaps on weekends. Students typically take the entire sequence of 1160, 2260, and 3360, but they may take any portion of the program if they have the necessary background as determined by a placement interview. Some students do choose to apply only to the summer portion. The spring semester of the Chinese program will be offered in Beijing at the School of International Studies at Peking University.

Students must formally apply to the program. To guarantee course availability and scholarship eligibility, applications must be received by March 1. After that, applicants are reviewed on a rolling basis and acceptance is contingent on the availability of spaces. The 1160–2260–3360 sequence fulfills the language requirement for the M.A. in Asian Studies and the joint M.B.A./M.A. in Asian Studies. Applications are available in 388 Rockefeller Hall or on the FALCON web site at lrc.cornell.edu/falcon/apply.

Study Abroad

There are many strong options for study abroad in Asia. Cornell Abroad helps students plan a year or semester abroad as part of their Cornell undergraduate degree. Cornell has affiliations with several programs and institutions in Asia and sends students to those and others.

Cornell is affiliated with IUP, the Inter-University Program for Chinese Language Studies in Beijing (at Tsinghua University) and is a member of CIEE and IES, organizations sponsoring study abroad programs offering Chinese language instruction at several levels as well as courses in Chinese studies in the humanities and social sciences. Students may also study at other programs in China, Hong Kong, and Taiwan. The Chinese FALCON program includes a spring semester in Beijing at Peking University.

Cornell is a member of the consortium of the Kyoto Center for Japanese Studies, an undergraduate semester or year program in Japanese language and Japanese studies. An agreement with International Christian University (ICU), outside Tokyo, permits Cornell students to attend that institution. Cornell students have attended CIEE and IES programs as well as other programs and institutions in Japan.

Cornell is a member of the American Association of Indian Studies, which offers fellowships for intensive study in India or Hindi, Bengali, and Tamil. There are study abroad options in universities or other organizations in various regions of India. In cooperation with Tribhuvan National University of Nepal, Cornell organizes the Cornell–Nepal Study Program for

undergraduate and graduate students wishing to spend a semester or year studying and conducting research in Nepal.

Students may spend a semester or year in Mongolia, Korea, Vietnam, Indonesia, Thailand, Singapore, or the Philippines or choose to study about Asia at such institutions as the School of Oriental and African Studies in London or the Faculty of Asian Studies at the Australian National University. Undergraduates should consult Cornell Abroad; graduate students should inquire at the East Asia Program, Southeast Asia Program, or South Asia Program offices.

Students may apply up to 15 credits from abroad to the major.

First-Year Writing Seminars

See John S. Knight Institute brochure for times, instructor, and descriptions.

Asia—General Education Courses

[ASIAN 1190 East Asia to 1800 (also HIST 1900) (HA-AS)]

Spring. 4 credits. Next offered 2010–2011. H. Hirano.

For description, see HIST 1900. (GE)

[ASIAN 1191 Introduction to Modern Asian History (also HIST 1910) @ (HA-AS)]

Fall. 4 credits. E. Tagliacozzo and S. Cochran.

For description, see HIST 1910. (GE)

[ASIAN 1192 Introduction to World Music II: Asia (also MUSIC 1302) @ (CA-AS)]

Fall. 3 credits. Next offered 2011–2012. M. Hatch.

For description, see MUSIC 1302. (GE)

[ASIAN 2208 Introduction to Southeast Asia @ (CA-AS)]

Fall. 3 credits. T. Chaloeintiarana.

For anyone curious about the most diverse part of Asia; defines Southeast Asia both as the nation-states that have emerged since 1945 (Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Vietnam) and as a larger cultural world extending from southern China to Madagascar and Polynesia. Students find a serious, organized introduction to a variety of disciplinary and topical approaches to this region, including geography, linguistics, history, religion and ideology, anthropology, marriage and family systems, music, literacy and literature, art and architecture, agriculture, industrialization and urbanization, politics and government, warfare and diplomacy, ecological and human degradation, and business and marketing. The course teaches both basic information and different ways of interpreting that information. (GE)

[ASIAN 2209 Script and Culture in East Asia (also ARTH 2801, HIST 2891) @ # (LA-AS)]

Fall. 3 credits. Next offered 2010–2011. B. Rusk.

Introduction to the history and cultural role of writing systems, with a focus on the case of East Asia. (GE)

[ASIAN 2211 Introduction to Japan @ # (CA-AS)]

Fall. 3 credits. J. M. Law.

This course surveys major disciplinary approaches in the social sciences and humanities to the study of Japan by focusing

on different historical formulations of Japanese native and national identity: Japan the sacred nation, Japan the aesthetic, Japan the warrior nation, Japan the peaceful (victim) nation, Japan the industrious economic superpower and Japan the hyper-modern. We introduce Japanese performance traditions, read fiction, poetry and plays, see classical films and recent anime, and study historical cases relating to each of these formulations. (GE)

[ASIAN 2212 Introduction to China @ # (CA-AS)]

Spring. 3 credits. R. McNeal.

Interdisciplinary introduction to Chinese culture especially designed for students not majoring in Asian Studies. Explores literature, history, religion, art and archaeology, and other aspects of China's rich and diverse heritage, from earliest times to the present. (GE)

[ASIAN 2215 Introduction to South Asia @ (HA-AS)]

Fall. 3 credits. A. Blackburn and L. McCrea.

This is an interdisciplinary introduction to the cultures and histories of South Asia, with special attention to the intersections of religion, political authority, and the arts, as well as problems connected to gender and development. Students will look briefly at South Asian migration as well. Many sections of the course focus on questions of identity and belonging, looking at how people express their relationship to places and social groups. This course is suitable for students not majoring in Asian Studies. Students with more specialized interests in Asia and Asian Studies are also welcome. (GE)

[ASIAN 2218 Introduction to Korea @ (CA-AS)]

Fall. 3 credits. J. Pak.

Multidisciplinary introduction to Korean history, society, and culture. The first part of the course will examine sources of Korean tradition in their historical contexts. The second part, on the transition to a modern society, will cover the mid–19th century to the Korean War. The last part will be devoted to contemporary society. (GE)

[ASIAN 2250 Introduction to Asian Religions (also RELST 2250) @ # (HA-AS)]

Spring. 3 credits. D. Boucher.

Explores religious traditions in South Asia (Pakistan, India, and Sri Lanka) and East Asia (China and Japan) including Hinduism, Buddhism (South Asian and East Asian), Sikhism, Confucianism, Daoism, and Shinto. Encounters a wide range of religious expressions as well, including myth, ritual, pilgrimage, mysticism, meditation, and other spiritual technologies. (GE)

Asia—Literature and Linguistics Courses

The following courses are taught entirely in English and are open to any Cornell student.

[ASIAN 2240 Love, War, and the Supernatural in Pre-Modern Japan @ # (LA-AS)]

Fall. 3 credits. J. Kanemitsu.

In this course, students will meet some of the most memorable characters depicted in Japanese literature, from the eighth through 18th centuries. In addition to each work's historical and cultural contexts, we will consider its literary conventions and think about how genres have been defined. A survey of representative works in Japan's

literary history, this course examines changing representations of idealized male and female protagonists as they pursue desire, conquest, and occasionally both. (LL)

[ASIAN 2241 China's Literary Heritage: An Introduction in Translation @ # (LA-AS)]

Spring. 3 credits. Next offered 2012–2013. D. X. Warner.

This is a survey course designed for, though not limited to, nonmajors with or without any knowledge of Chinese language, history, or culture. Students read a broad selection in translation of poems, prose, and narrative writings from the pre-modern period on a variety of themes. (LL)

[ASIAN 2279 Chinese Mythology @ # (LA-AS)]

Summer. 3 credits. R. McNeal.

Students will study Chinese myths from the earliest times down to the late imperial era. Focus will be on understanding the form Chinese myths take, how they are related to religion, literature, historical accounts and intellectual trends. (LL)

[ASIAN 3318 Literature and Media in Japan (also COML 3150, VISST 3318)]

Fall. 3 credits. B. de Bary.

Dissolving the conventional distinction between literary studies and media studies, the course will first consider the formation of a modern national literature within the environment of rapidly transforming media in late 19th-century Japan. The primary focus, however, will be on dynamic relays and reciprocal influences among contemporary novels, films, anime, comics, video games, and digital arts. The course will use materials with translations or subtitles in English. (LL)

[ASIAN 3365 Traditional Japanese Theatre (also ASIAN 6665)]

Spring. 3 credits. J. Kanemitsu.

An introduction to seven genres of Japanese performing arts from the 14th through 19th centuries. In addition to examining pivotal moments in itinerant storytelling, dramatic literature, and dramaturgical treatises, we will also consider transformations in performance spaces and costuming as well as the traditions of artistic transmission. We will also be viewing recordings of modern performances and cinematic adaptations. All readings will be in English; no knowledge of the Japanese language will be required. (LL)

[ASIAN 3370 Global Martial Arts, Film, and Literature (also COML/FILM 3701)]

Spring. 4 credits. P. Liu.

For description, see COML 3701. (LL)

[ASIAN 3373 20th-Century Chinese Literature @ (LA-AS)]

Fall. 4 credits. Next offered 2010–2011. E. Gunn. (LL)

[ASIAN 3374 Chinese Narrative Literature @ # (LA-AS)]

Fall. 4 credits. E. Gunn.

Selected works in classical Chinese fiction are read in translation. Major novels, such as *The Dream of the Red Chamber* and *Water Margin*, are emphasized. (LL)

[ASIAN 3379 Southeast Asian Literature in Translation @ (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. L. Paterson. (LL)

[ASIAN 3380 Vietnamese Literature in Translation (also ASIAN 6680) @ # (LA-AS)]

Fall. 4 credits. Next offered 2010–2011.
L. Paterson. (LL)

[ASIAN 3387 Literature and Film of South Asia (also COML 3860, VISST 3870) @ (CA-AS)]

Spring. 4 credits. Next offered 2010–2011.
A. Banerjee. (LL)

ASIAN 3389 Partition/Fiction and Film (also COML 3850)

Fall. 4 credits. A. Banerjee.
For description, see COML 3850. (LL)

ASIAN 4411 History of the Japanese Language (also LING 4411, JAPAN 4410) @ # (HA-AS)]

Fall. 4 credits. J. Whitman.
For description, see LING 4411. (LL)

[ASIAN 4412 Linguistic Structure of Japanese (also LING 4412) (KCM-AS)]

Spring. 4 credits. Next offered 2010–2011.
J. Whitman.
For description, see LING 4412. (LL)

ASIAN 4424 Asia Memoirs: Trauma and Social Upheaval in East and Southeast Asia (also ASIAN 6627) @ (CA-AS)]

Spring. 4 credits. L. Paterson.
From the Chinese Cultural Revolution to Khmer Rouge Cambodia, social upheaval in Asia has given rise to a genre of trauma memoir. In this course we will discuss how periods of societal terror are represented and remembered within these personal narratives. Through reading such accounts in conjunction with secondary scholarship, we will examine various issues of representation such as intended audience, construction of memory, and framing of individual experience. We will also examine to what extent these accounts contribute to, or contradict, national narratives of the respective countries. (LL)

[ASIAN 4430 Structure of Korean (also LING/KOREA 4430) (KCM-AS)]

Spring. 4 credits. Next offered 2010–2011.
J. Whitman.
For description, see LING 4430. (LL)

[ASIAN 4437 Research Methods in Pre-Modern China (also ASIAN 6611) @ # (LA-AS)]

Fall. 4 credits. Next offered 2010–2011.
B. Rusk. (LL)

[ASIAN 4481 Translation and Cultural Difference (also COML 4700) @ (KCM-AS)]

Fall. 4 credits. Next offered 2010–2011.
N. Sakai.
The course will explore the broader conception of translation in terms of which to critically understand communication as the ideology of Capital. (LL)

ASIAN 5505 Methodology of Asian Language Learning and Teaching

Spring. 2 credits. Limited enrollment.
Preference given to graduate students in Asian Studies and Linguistics. R. Sukle.
This is a course for anyone interested in the pedagogy of Asian languages; required for graduate students seeking appointment as teaching assistants and those seeking as continuing appointments as teaching associates in the Department of Asian Studies for Chinese, Hindi and Urdu, Japanese, and Korean. The course presents theories of language teaching and learning, provides

classroom observation and practice teaching, and outlines the basics of phonology, morphology, grammar, sociolinguistics, pragmatics, and discourse structure and other features of language use. (LL)

Asia—Religion Courses**ASIAN 2220 Buddhism in America (also RELST 2220) (CA-AS)]**

Summer. 3 credits. J. M. Law.
This course focuses on a threefold division of Buddhist communities in America: (1) communities established by Asian teachers with predominantly western community members; (2) communities established to serve the needs of immigrant communities arriving from traditionally Buddhist cultures; and (3) communities established by refugee communities. The class explores how these three different methods of arrival and establishment of Buddhist traditions in North America influence the decisions these communities make as they adapt Buddhism to a new cultural setting. We also look at the writings of several thinkers who deal with the multicultural setting. We also look at the writings of several thinkers who deal with the multicultural nature of American religious life, including Buddhism in the community of American religions in the 21st century. (RL)

[ASIAN 2226 Society and Religion in China (also HIST 2261) @ # (HA-AS)]

Fall. Next offered 2010–2011. T. J. Hinrichs. (RL)

ASIAN 2277 Meditation in Indian Culture (also RELST 2277) @ # (CA-AS)]

Spring. 3 credits. D. Gold.
Probes the truths behind traditional claims of the priority of internal practice in Indian traditions. Students are expected to experiment with some basic meditation practices and situate them within larger South Asian world views as suggested by doctrines, rituals, iconic forms, and literary texts. Grades are based on short papers. (RL)

ASIAN 3309 Temple in the World: Buddhism in Contemporary South and Southeast Asia (also RELST 3309) @ (CA-AS)]

Spring. 3 credits. A. Blackburn.
Buddhism is often thought of as a meditative and philosophical tradition, remote from the concerns and pleasures of everyday life, practical ethics, and politics. This course explores the unfolding of Buddhist life in contemporary South and Southeast Asia, in locations such as Burma, Thailand, India, Sri Lanka, Malaysia, and Cambodia. We will see how the practices of meditation and philosophical reflection enter the lives of Buddhists, along with other expressions of devotion, aesthetic fascination, political action, and sociability. Our goal will be to recognize the sensual, emotional, and social qualities of Buddhist practice, and the ways in which life unfolds in a Buddhist idiom. (RL)

[ASIAN 3344 Introduction to Indian Philosophy # @ (KCM-AS)]

Fall. 4 credits. Next offered 2010–2011.
L. McCrea. (RL)

[ASIAN 3347 Tantric Traditions (also RELST 3349) @ # (CA-AS)]

Fall. 4 credits. Next offered 2010–2011.
D. Gold. (RL)

[ASIAN 3348 Indian Devotional Poetry (also RELST 3347) @ # (LA-AS)]

Spring. 4 credits. Next offered 2011–2012.
D. Gold. (RL)

ASIAN 3351 Indian Religious Worlds (also RELST 3351) @ (CA-AS)]

Spring. 4 credits. D. Gold.
A study of religious traditions as lived today in the Indian subcontinent. Attention will be paid to differences in piety and practice within alternative environments. (RL)

ASIAN 3353 Mysticism in Chinese Religion (also RELST 3353) @ # (CA-AS)]

Fall. 4 credits. D. Boucher.
This course will examine techniques of spiritual cultivation in both the Daoist and Buddhist traditions of China. In particular we will compare and contrast methods which focus on the manipulation of bodily energies and fluids, particularly in the early and medieval Daoist traditions, with the Buddhist emphasis on cognitive transformation, particularly in the Chan school. Some of our discussion will also look at the debates on the nature of mystical states as “pure consciousness events” on the one hand, or culturally specific constructions on the other. (RL)

[ASIAN 3354 Indian Buddhism (also ASIAN 6654, RELST 3354/6654) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011.
D. Boucher. (RL)

[ASIAN 3355 Japanese Religions (also RELST 3355) @ (CA-AS)]

Spring. 4 credits. Next offered 2010–2011.
J. M. Law. (RL)

ASIAN 3359 Japanese Buddhism: Texts in Context (also RELST 3359) @ # (HA-AS)]

Spring. 4 credits. J. M. Law.
Focuses on six figures in Japanese Buddhism: Saichō (767–822), Kūkai (774–835), Hōnen (113–1212), Nichiren (1222–1282), Dōgen (1200–1253), and Hakuin (1686–1769). Studies their lives, writings, core practices and doctrines, and a central religious dynamic the work of each embodies: establishment of a Mahayana ordination, esoteric practice, the popularization of Buddhism, Buddhist pronominalist ideologies, and establishment of Zen meditation as iconic “Japanese” Buddhism. (RL)

ASIAN 4405 Zen Buddhism: Experience and Ideology (also RELST 4405) @ # (CA-AS)]

Spring. 4 credits. J. M. Law.
Explores the ideological and religious claims of Zen tradition, focusing on religious, historical, and aesthetic developments in Japan. We'll rely on primary sources in translation and secondary sources by scholars in religion and Buddhist Studies. Reading classic text on Zen for American audiences, course starts with rise of Ch'an tradition in China and development of Northern and Southern Schools, reading primary sources in translation. In Japan, we'll look at establishment of Zen in Kamakura period, focusing on developments of Rinzaï and Soto Zen, and early transmissions of Chinese texts/practices to Japan through emissaries. To understand the developments of these schools, we'll study the lives/writings of Eisai and Dōgen, and how their life works/writings influenced developments in Zen. We'll explore

the work of the Tokugawa Zen figure Hakuin through a focus on his key works, and his vision of Zen reform. We will study the ways Zen has become implicated in Japanese postwar identity discourses, focusing on critical readings of D. T. Suzuki and others that create an aestheticism central to Japanese national identity. Finally direct spiritual cultivation has rooted itself in American soil. Includes field trip to one of the largest Zen monasteries in North America, near Ithaca, and a visit from a prominent Zen priest from Japan.

[ASIAN 4421 Religious Reflections on the Human Body (also RELST 4421) (KCM-AS)]

Fall. 4 credits. Prerequisites: one religious studies course or permission of instructor. Next offered 2010-2011. J. M. Law. (RL)

[ASIAN 4427 Buddhist Monasticism (also RELST 4427) @ # (CA-AS)]

Fall. 4 credits. D. Boucher. This seminar will investigate a range of monastic vocations and interests. We will be particularly interested in the socioeconomic impact of monasticism on Buddhist societies: why have so many people dedicated so much capital to the preservation of an institution that seemingly contributes nothing to the economy? We will also want to ask questions about monastic motivations: why would someone choose to live this kind of life? What are its advantages? How do such choices influence monastic attitudes to the laity and, particularly, to women? (RL)

[ASIAN 4438 Monks, Texts, and Relics: Transnational Buddhism in South and Southeast Asia (also ASIAN 6638, RELST 4438/6638) (CA-AS)]

Spring. 4 credits. A. Blackburn. What role did magic and ritual play in the growth of Buddhism in South and Southeast Asia? Where did Buddhist monks travel and why? This course examines how Buddhist communities were formed by networks that carried monks, potent texts, and relic talismans throughout these regions, from the beginning of Buddhism to the present day. (RL)

[ASIAN 4441 Mahayana Buddhism (also RELST 4441) @ # (CA-AS)]

Spring. 4 credits. Next offered 2010-2011. D. Boucher. (RL)

[ASIAN 4444 Ritual Puppetry in a Global Context (also RELST/THETR 4444, DANCE 4377) @ # (CA-AS)]

Spring. 4 credits. Next offered 2010-2011. J. M. Law. (RL)

[ASIAN 4449 History and Methods of the Academic Study of Religion (also RELST 4449) # (KCM-AS)]

Spring. 4 credits. Prerequisite: two courses in religious studies major or permission of instructor. D. Boucher.

Provides advanced students in religious studies or the humanities familiarity with important methodological issues in the academic study of religion. (RL)

[ASIAN 4460 Indian Meditation Texts (also RELST 4460) @ # (KCM-AS)]

Fall. 4 credits. No knowledge of Indian languages required. Next offered 2010-2011. D. Gold.

Draws on approaches from literary criticism, anthropology, and religious studies to explore texts that record religious experience. (RL)

[ASIAN 4462 Religion, Colonialism, and Nationalism in South and Southeast Asia (also ASIAN 6662, RELST 4462) (CA-AS)]

Fall. 4 credits. Prerequisites: one course in ANTHR, ASIAN, HIST, RELST at 3000 level or above or permission of instructor.

A. Blackburn.

Taught as a seminar, the course engages recent theoretical literature on the relations between religion, colonialism and nation formation. This theoretical literature is read in conjunction with historical and ethnographic materials from South and Southeast Asian contexts, which allow us to explore the intellectual promise and limitations of the theoretical work in question. (RL)

[ASIAN 4489 Religion and Sustainability: Traditionalist Discourses in the 21st Century (also RELST 4489) @ (CA-AS)]

Fall. 4 credits. Prerequisite: permission of instructor. J. M. Law.

The natural world and the relationship of human beings and animals to it and within it is a central component of cosmogonic myths and religious ideologies in most major religious traditions. In this course, we explore how mythological, textual, ritual and ideological understandings of the relationship between human beings and the natural world uniform understandings of the contemporary environmental crisis and the responsibility of human beings to address it. We'll also explore how different approaches to environmentalism have tried to incorporate various religions. This class will focus on cases from Hindu, Buddhist, Jain, Jewish, Christian and Muslim discourses on the natural world. We'll explore a variety of models of formulating the human/natural relationship: dominion, stewardship, illusion, primary sacrality and alienation. We challenge the view that grounding environmental activism in religious discourse is an effective way for environmental work to proceed and look at concrete case studies of religious communities working for, or against, environmental sustainability. (RL)

Asia—Society and Culture Courses

[ASIAN 2206 The Occidental Tourist: Travel Writing and Orientalism in Southeast Asia (also ASIAN 5507, HIST 2070/5070) @ (CA-AS)]

Fall. 4 credits. Next offered 2010-2011. T. Loos. (SC)

[ASIAN 2210 Pop Culture in China (also HIST 2210) @ (HA-AS)]

Spring. 4 credits. Next offered 2011-2012. T. J. Hinrichs.

For description, see HIST 2210. (SC)

[ASIAN 2219 Women and Gender in South Asia (also FGSS/HIST 2190) @ (HA-AS)]

Fall. 4 credits. Next offered 2010-2011. D. Ghosh. (SC)

[ASIAN 2225 Literature, Politics, and Genocide in Cambodia (also ASIAN 4422) @ (CA-AS)]

Summer. 3 credits. G. Chigas.

This course will examine various literary, historical, and political responses to the Cambodian genocide, particularly literary testimony by survivors and governmental efforts to bring the perpetrators to justice. The course considers the limited effectiveness of these responses for addressing the causes and effects of genocide despite the vow of "never

again." To pursue these questions, students will read selections from novels and poetry written by Cambodian survivors, along with historical accounts of the genocide and analysis attempts by the Cambodian government and the international community to bring the perpetrators to justice. (SC)

[ASIAN 2228 Indian Ocean World (also HIST 2280) @ # (HA-AS)]

Spring. 4 credits. Next offered 2010-2011. Limited to 15 students. E. Tagliacozzo. (SC)

[ASIAN 2238 Families in China Since 17th Century (also HIST 2380) @ (HA-AS)]

Fall. 4 credits. S. Cochran. For description, see HIST 2380. (SC)

[ASIAN 2245 Gamelan in Indonesian History and Cultures (also MUSIC 1341, VISST 2744) @ (LA-AS)]

Fall or spring. 3 credits. Prerequisite: permission of instructor. C. Miller. For description, see MUSIC 1341. (SC)

[ASIAN 2257 China Encounters the World (also CAPS 2570, HIST 2571) @ (HA-AS)]

Fall. 3 credits. J. Chen. For description, see HIST 2571. (SC)

[ASIAN 2259 The Vietnam Wars in Film]

Fall. 3 credits. L. Paterson. This course will explore cinematic depictions of the Indochina Wars from the United States, Vietnam and France. By exploring films from all three participant countries, the historical, social, and cultural contexts of these iconic wars will be critiqued. (SC)

[ASIAN 2260 Popular Culture of Japan]

Spring. 3 credits. J. Kanemitsu. In this writing-intensive course, we will examine and analyze the mass and pop cultures of Japan from the Tokugawa period (1600-1868) up to the present, considering how the cultural conventions of different eras have been coded, decoded, and recoded. The overall course will be divided into a variety of modules, including media and communication; illustrated fiction and manga; theater, TV melodrama, and anime; gender identity, recreation, fashion. (SC)

[ASIAN 2275 History of Modern South Asia (also HIST 2750) @ # (HA-AS)]

Spring. 4 credits. D. Ghosh. For description, see HIST 2750. (SC)

[ASIAN 2281 Antiquity and Modernity in Contemporary China (also CAPS 2281) @ # (CA-AS)]

Spring. 3 credits. Next offered 2010-2011. R. McNeal (SC)

[ASIAN 2290 East Asian Martial Arts (also HIST 2960) @ (HA-AS)]

Fall. 4 credits. Next offered 2011-2012. T. J. Hinrichs. For description, see HIST 2960. (SC)

[ASIAN 2294 History of China in Modern Times (also HIST 2940) @ (HA-AS)]

Fall. 4 credits. Next offered 2010-2011. S. Cochran. (SC)

[ASIAN 2295 Power, Culture, and Heterogene in Premodern Japan (also HIST 2981) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010-2011. K. Hirano. For description, see HIST 2981. (SC)

[ASIAN 2296 From Slow Boats to CEOs?: The Chinese of Southeast Asia @ (CA-AS)

Spring. 4 credits. Next offered 2010–2011.
L. Paterson. (SC)

[ASIAN 2298 The U.S.–Vietnam War (also HIST 2890) @ (HA-AS)

Fall. 4 credits. Next offered 2010–2011.
F. Logevall. (SC)

[ASIAN 3301 Schools of Thought—Ancient China @ # (HA-AS)

Spring. 4 credits. Next offered 2010–2011.
R. McNeal.

This class is a critical, in-depth introduction to the intellectual history of ancient China. Students will read translations from early Confucian, Legalist, Mohist, and Daoist texts, as well as lesser-known works from, e.g., the Yin-Yang school. (SC)

[ASIAN 3302 Art of War in Ancient China @ # (HA-AS)

Fall. 4 credits. Next offered 2010–2011.
R. McNeal. (SC)

ASIAN 3305 Seminar on American Relations with China (also CAPS 3000, HIST 3391) (HA-AS)

Fall. 4 credits. Taught in Washington, D.C.
R. Bush.

For description, see CAPS 3000. (SC)

ASIAN 3315 Banaras: Sacred Geography @ (CA-AS)

Winter. 3 credits. Course taught in Banaras, India. D. Gold and R. Gupta.

An interdisciplinary exploration of the notion “Sacred Geography” in India’s oldest continually occupied urban settlement. Students will be totally immersed in the history, culture, architecture, and traditional and performing arts of Banaras and will reflect on the notion of the city as metaphor, specifically the self-conscious representation of a city as embodiment of cosmos. (SC)

[ASIAN 3328 Construction of Modern Japan (also HIST 3280) @ # (HA-AS)

Spring. 4 credits. Next offered 2010–2011.
J. V. Koschmann. (SC)

ASIAN 3334 Government and Politics of Southeast Asia (also GOVT 3443) @ (HA-AS)

Spring. 4 credits. T. Pepinsky.

For description, see GOVT 3443. (SC)

[ASIAN 3335 Japan from War to Prosperity (also HIST 3300) @ (HA-AS)

Fall. 3 credits. Next offered 2011–2012.
J. V. Koschmann. (SC)

ASIAN 3346 Modern Japanese Politics (also GOVT 3463) @ (SBA-AS)

Spring. 4 credits. S. Martin.

For description, see GOVT 3463. (SC)

ASIAN 3350 The Arts of Southeast Asia (also ARTH 3850, VISST 3696) @ # (CA-AS)

Fall. 4 credits. K. McGowan.

For description, see ARTH 3850. (SC)

[ASIAN 3361 Bakumatsu–ISHIN: Conflicts and Transformation in Early Modern Japan, 1700–1890 (also HIST 3611) @ (HA-AS)

Fall. 4 credits. Next offered 2011–2012.
K. Hirano. (SC)

[ASIAN 3381 Introduction to the Arts of Japan (also ARTH 3820) @ # (LA-AS)

Fall. 4 credits. Next offered 2010–2011.

A. Pan.

For description, see ARTH 3820. (SC)

[ASIAN 3382 Art of South Asia, 1500–Present (also ARTH 3611) @ # (CA-AS)

Spring. 4 credits. Next offered 2010–2011.

I. Dadi.

For description, see ARTH 3611. (SC)

ASIAN 3383 Introduction to the Arts of China (also ARTH 3800) @ # (LA-AS)

Fall. 4 credits. A. Pan.

For description, see ARTH 3800. (SC)

[ASIAN 3385 History of Vietnam (also ASIAN 6685, HIST 3880/6880) @ # (HA-AS)

Fall. 4 credits. Meets concurrently with ASIAN 6685. Graduate students may enroll and attend a seminar sec. Next offered 2010–2011. K. Taylor.

Survey of Vietnamese history and culture from earliest times to the present. (SC)

ASIAN 3386 Southeast Asia through Film @ (CA-AS)

Spring. 4 credits. L. Paterson.

In Western films Southeast Asia has always been portrayed as an exotic locale of romance, haunting landscapes, and “inscrutable” smiling natives. This class will explore the ways in which the countries of Southeast Asia have been portrayed in Western cinema, in juxtaposition with films produced in the countries themselves. In what ways is this exotic region constructed through Western eyes? To what degree has Southeast Asian cinema itself imitated the Occidental construct? What are the cultural themes explored by Southeast Asian filmmakers themselves? Through close analysis of the films, we will explore the process of visual translation from reality to fantasy in both the local and international contexts. (SC)

[ASIAN 3388 Theorizing Gender and Race in Asian Histories and Literatures (also ASIAN 6688, COML 3980/6680, FGSS 3580/6580) @ (CA-AS)

Spring. 4 credits. Next offered 2010–2011.
N. Sakai. (SC)

[ASIAN 3391 Martial Arts and Society and Religion (also HIST 3191) @ (HA-AS)

Fall. 4 credits. Next offered 2011–2012.
T. J. Hinrichs. (SC)

ASIAN 3394 The House and the World: Architecture of Asia (also ARTH 3855/VISST 3655) @ # (HA-AS)

Spring. 4 credits. K. McGowan.

For description, see ARTH 3855. (SC)

ASIAN 3396 Southeast Asian History from the 18th Century (also HIST 3960/6960) @ (HA-AS)

Spring. 4 credits. E. Tagliacozzo.

For description, see HIST 3960. (SC)

[ASIAN 3397 Premodern Southeast Asia (also ASIAN 6697, HIST 3950/6950) @ # (HA-AS)

Fall. 4 credits. Next offered 2010–2011.
E. Tagliacozzo.

For description, see HIST 3950. (SC)

[ASIAN 4409 Archipelago: The Worlds of Indonesia (also ASIAN 6617, HIST 4100/6100) @ (HA-AS)

Spring. 4 credits. Next offered 2010–2011.
E. Tagliacozzo. (SC)

[ASIAN 4410 Chinese Film @ (LA-AS)

Spring. 4 credits. Next offered 2010–2011.
E. Gunn. (SC)

ASIAN 4413 Religion and Politics in Southeast Asia (also ANTHR 4513) @ (CA-AS)

Spring. 4 credits. A. Willford.

For description, see ANTHR 4513. (SC)

[ASIAN 4416 Gender and Sexuality in Southeast Asian History (also ASIAN 6618, FGSS 4160, HIST 4160/6160) @ (CA-AS)

Fall. 4 credits. Next offered 2011–2012.
T. Loos. (SC)

ASIAN 4417 Themes and Problems in Asian Studies # (CA-AS)

Spring. 4 credits. B. de Bary.

Strongly recommended for Asian Studies majors and prospective majors, this course provides an overview of themes and problems central to work in Asian Studies. We will see how Asian Studies developed as a field of academic inquiry, and explore central themes in the present discipline of Asian Studies. How are Asian traditions invented and transmitted? How do we study the histories of Asian literatures and aesthetics? How have mixed media and technologies shaped Asian worlds from the age of manuscripts and block prints to the digital era? What is the place of ritual and performance in Asian contexts? Is “popular culture” a new phenomenon in Asia? This course is intended for juniors and seniors. Open to first- and second-year students only with permission of instructor. (SC)

ASIAN 4422 Literature, Politics, and Genocide in Cambodia (also ASIAN 2225) @ (CA-AS)

Summer. 3 credits. G. Chigas.

For description, see ASIAN 2225. (SC)

[ASIAN 4426 Hist/Mem of Asia-Pacific War (also HIST 4070) @ (HA-AS)

Spring. 4 credits. Next offered 2012–2013.
J. V. Koschmann.

For description, see HIST 4070. (SC)

[ASIAN 4428 Formation of the Field (also HIST 4428) @ (HA-AS)

Fall. 4 credits. Next offered 2010–2011.
N. Sakai. (SC)

ASIAN 4429 Vitality and Power in China (also HIST/RELST/SHUM 4931, STS 4911)

Spring. 4 credits. T. J. Hinrichs.

For description, see SHUM 4931. (SC)

ASIAN 4435 Theatre and Society: A Comparative Study of Asian Dramatic Cultures (also ASIAN 6632, THETR 4320/6320) @ (CA-AS)

Spring. 4 credits. H. Yan.

For description, see THETR 4320. (SC)

ASIAN 4436 Topics in Indian Film (also VISST 4436) @ (LA-AS)

Fall. 4 credits. No knowledge of an Indian language required. D. Gold.

Treats various aspects of Indian film, with focal topics to vary from year to year. These topics include religion in Indian film, Indian art films, and the golden age of Indian film. All topics are discussed in relation to the conventions of mainstream Bollywood cinema

and their social and cultural significances. Attendance at weekly screenings is required. (SC)

ASIAN 4456 Dancing the Stone: Body and Memory (also ARTH 4858)

Spring. 4 credits. K. McGowan.
For description, see ARTH 4858. (SC)

ASIAN 4465 Cold War Aesthetics in East Asia (also COML 4430)

Fall. 4 credits. P. Liu.
For description, see COML 4430. (SC)

[ASIAN 4468 Arendt, Morisaki, Weil (also ASIAN 6668, COML 4380/6240) (KCM-AS)]

Fall. 4 credits. Limited to 20 students. Next offered 2010-2011. B. de Bary. (SC)

[ASIAN 4469 History of Medicine and Healing in China (also ASIAN 6692, BSOC/HIST/STS 4961, HIST 6961) @ # (HA-AS)]

Spring. 4 credits. Next offered 2010-2011. T. J. Hinrichs. (SC)

ASIAN 4487 Threads of Consequence (also ARTH 4855)

Spring. 4 credits. K. McGowan.
For description, see ARTH 4855. (SC)

ASIAN 4490 China's Economy Under Mao and Deng (also ECON/CAPS 4690) @ (SBA-AS)

Spring. 4 credits. T. Lyons.
For description, see ECON 4690. (SC)

[ASIAN 4493 Problems in Modern Chinese History (also ASIAN 6693, HIST 4930/6930) @ (HA-AS)]

Fall. 4 credits. Prerequisite: ASIAN 2294/HIST 2940 or permission of instructor. Next offered 2010-2011. S. Cochran. (SC)

[ASIAN 4494 India: Nation and Narration, History and Literature (also HIST 4921) @ (CA-AS)]

Spring. 4 credits. Next offered 2011-2012. D. Ghosh and A. Banerjee. (SC)

[ASIAN 4499 Problems in Modern Chinese History (also HIST 4990/6940) @ (HA-AS)]

Spring. 4 credits. Prerequisite: permission of instructor. Next offered 2011-2012. S. Cochran. (SC)

[ASIAN 5507 The Occidental Tourist (also ASIAN 2206, HIST 2070/5070)]

Fall. 4 credits. Next offered 2010-2011. T. Loos. (SC)

ASIAN 5599 East Asian Colloquium (also HIST 6020)

Fall and spring. 2 credits. Graduate students only. K. Hirano.
For description, see HIST 6020. (SC)

Asia—Graduate Seminars

For complete descriptions of courses numbered 6000 or above, see www.lrc.cornell.edu/asian.

ASIAN 6602 Southeast Asia Seminar

Spring. 4 credits. Staff. (SC)

ASIAN 6603 Southeast Asia Field Seminar

Spring. 4 credits. Staff. (SC)

[ASIAN 6604 Southeast Asia Topical Seminar]

Spring. 3-4 credits. Next offered 2009-2010. Staff. (SC)

[ASIAN 6611 Research Methods in Pre-Modern China (also ASIAN 4437)]

Fall. 4 credits. Next offered 2010-2011. B. Rusk.

For description, see ASIAN 4437. (LL)

ASIAN 6612 Japanese Bibliography and Methodology

Fall. 1 credit. Requirement for honors students and M.A. candidates. Prerequisite: permission of instructor. D. McKee. (LL)

ASIAN 6613 South East Asian Bibliography and Methodology

Spring. 1 credit. Recommended: reading knowledge of at least one SE Asian language or other Asian language and a major European language. G. Green. (LL)

[ASIAN 6615 Histories of Tokugawa Japan (also HIST 6150)]

Fall. 4 credits. Next offered 2011-2012. K. Hirano. (SC)

[ASIAN 6617 Archipelago: The Worlds of Indonesia (also ASIAN 4409, HIST 4100/6617)]

Spring. 4 credits. Next offered 2010-2011. E. Tagliacozzo. (SC)

[ASIAN 6618 Gender and Sexuality in Southeast Asian History (also ASIAN 4416, HIST 4160/6160)]

Fall. 4 credits. Prerequisite: graduate standing. Next offered 2011-2012. T. Loos. (SC)

ASIAN 6619 Graduate Seminar: Translation in Theory (also COML 6160, VISST 6619)

Spring. 4 credits. B. de Bary.
The course provides an introduction to various aspects of translation theory, and emphasizes relations between translation theory and trauma theory, post-structuralism, post-colonial theory, and debates on comparative literature, "world literature," and area studies. (LL)

[ASIAN 6626 The 18th Century and the Emergence of Literary Modernity (also COML 6380)]

Spring. 4 credits. Next offered 2010-2011. N. Sakai.]

ASIAN 6627 Asia Memoirs: Trauma and Social Upheaval in East and Southeast Asia (also ASIAN 4424)

Spring. 4 credits. L. Paterson.
For description, see ASIAN 4424. (LL)

ASIAN 6629 Contemporary Studies of Japan

Spring. 4 credits. N. Sakai.
This course will help graduate students meet new demands of contemporary East Asian studies. Emphasis will be on students' ability to express themselves and engage in their interlocutors' debates. While reading texts particularly influential in the early and contemporary formation of the field and its critique, we will consider such questions as, what is academically and intellectually shared between American and East Asian intellectuals in the fields of humanities; how area studies specialists can engage in transnational problematics; and what is the relationship between "Japan" as an object of area studies discourse and "America" as represented in Japanese journalism, popular culture, and politics. This course will encourage students to discuss not area related topics but reflectively their own theoretical concerns in the Japanese language. (SC)

ASIAN 6632 Theatre and Society: A Comparative Study of Asian Dramatic Cultures (also ASIAN 4435, THETR 4320/6320)

Spring. 4 credits. H. Yan.
For description, see THETR 4320. (SC)

ASIAN 6638 Monks, Texts, and Relics: Transnational Buddhism in South and Southeast Asia (also ASIAN 4438, RELST 4438/6638)

Spring. 4 credits. A. Blackburn.
For description, see ASIAN 4438. (RL)

[ASIAN 6650 Seminar in Asian Religions (also RELST 6650)]

Fall. 4 credits. Limited to 10 students. Prerequisite: graduate standing. Next offered 2010-2011. Staff.]

[ASIAN 6654 Indian Buddhism (also ASIAN 3354, RELST 3354/6654)]

Spring. 4 credits. Graduate students attend ASIAN 3354 and arrange additional meetings with instructor. Next offered 2010-2011. D. Boucher. (RL)]

[ASIAN 6659 Seminar in Vedic Philology (also CLASS 7690, LING 6659) (KCM-AS)]

Fall. 4 credits. Next offered 2010-2011. M. Weiss.

For description, see LING 6659. (LL)]

ASIAN 6662 Religion, Colonialism, and Nationalism in South and Southeast Asia (also ASIAN/RELST 4462)

Fall. 4 credits. Prerequisites: one course in ANTHR, ASIAN, HIST, RELST at 3000 level or above or permission of instructor. A. Blackburn.

For description, see ASIAN 4462. (RL)

ASIAN 6665 Traditional Japanese Theatre (also ASIAN 3365)

Spring. 4 credits. J. Kanemitsu.
For description, see ASIAN 3365. (LL)

[ASIAN 6668 Arendt, Morisaki, Weil (also ASIAN 4468, COML 4380/6240)]

Fall. 4 credits. Next offered 2010-2011. B. de Bary. (SC)]

[ASIAN 6671 Paleoanthropology of South Asia (also ANTHR 6371, BIOEE 6710)]

Fall. 3 credits. Limited to 15 students. Next offered 2010-2011. K. A. R. Kennedy.]

ASIAN 6676 Southeast Asia Reading Seminar: The Early Thai Novels

Spring. 4 credits. T. Chaloeontarana.
Seminar participants will read selected early Thai novels in the vernacular to critique their role and relevance to our understanding of Thai intellectual culture, history, politics, and engagement with modernity. The seminar will privilege contextual analysis guided by New Historicism, translation theory, and post-colonial theory. Interested students should contact the instructor before signing up for this class. (LL)

[ASIAN 6680 Vietnamese Literature in Translation (also ASIAN 3380)]

Fall. 4 credits. Next offered 2010-2011. L. Paterson.

For description, see ASIAN 3380. (LL)]

[ASIAN 6681 Intellectual History of Empire (also HIST 6810)]

Spring. 4 credits. Next offered 2011-2012. J. V. Koschmann and N. Sakai. (SC)]

[ASIAN 6685 History of Vietnam (also ASIAN 3385, HIST 3880/6880)

Fall. 4 credits. Next offered 2010–2011.
K. Taylor.

For description, see ASIAN 3385. (SC)

[ASIAN 6688 Theorizing Gender and Race in Asian Histories and Literature (also ASIAN 3388, COML 3980/6680, FGSS 3580/6580, HIST 3880/6880)

Spring. 4 credits. Prerequisite: reading knowledge of Japanese. Next offered 2010–2011. N. Sakai. (SC)

[ASIAN 6692 Medicine and Healing in China (also ASIAN 4469, BSOC/HIST/STS 4961, HIST 6961)

Spring. 4 credits. Next offered 2010–2011.
T. J. Hinrichs. (SC)

[ASIAN 6693 Problems in Modern Chinese History (also ASIAN 4493, HIST 4930/6930)

Fall. 4 credits. Next offered 2010–2011.
S. Cochran. (SC)

[ASIAN 6694 Problems in Modern Chinese History (also ASIAN 4499, HIST 4990/6940)

Spring. 4 credits. Next offered 2011–2012.
S. Cochran. (SC)

ASIAN 6696 Modern Southeast Asia: Graduate Proseminar (also HIST 3960/6960)

Spring. 4 credits. E. Tagliacozzo.
For description, see HIST 3960. (SC)

[ASIAN 6697 Premodern Southeast Asia (also ASIAN 3397, HIST 3950/6950)

Fall. 4 credits. Next offered 2010–2011.
E. Tagliacozzo.

For description, see HIST 3950. (SC)

[ASIAN 6698 Seminar in Japanese Thought (also HIST 6980)

Fall. 4 credits. Limited to 15 graduate students. Prerequisite: reading knowledge of Japanese. Next offered 2010–2011.
J. V. Koschmann. (SC)

ASIAN 7701–7702 Graduate Seminar in East Asian Literature

7701, fall; 7702, spring. 4 credits.
B. de Bary.

This course will take up Japanese language texts written by members of the “Circle Village” collective established in 1959 near Fukuoka. Work by Morisaki Kazue, Ishimure Michiko, Tanigawa Gan, and Ueno Eishin will form the core readings, but we will also consider related visual texts (woodblock prints and photography). Recent English-language research and theoretical texts will contextualize these readings. Graduate students interested in art/activist projects contemporary to the Circle Village project will be invited to make class presentations.

ASIAN 7703–7704 Directed Research

7703, fall or spring; 7704, fall or spring.
1–4 credits. Staff.

[ASIAN 7708 Academic Study of Religion

Fall. 4 credits. Prerequisite: graduate standing and permission of instructor. Letter grades only. Next offered 2010–2011 or by demand. J. M. Law.

This course is limited to graduate students with a strong interest in the academic study of religion. (RL)

ASIAN 8899 Master's Thesis Research

Fall, spring. 2–4 credits. Staff.

ASIAN 9999 Doctoral Dissertation Research

Fall, spring. 2–4 credits. Staff.

Asia—Honors and Supervised Reading Courses**ASIAN 4401 Asian Studies Honors Course**

Fall or spring. 4 credits. Prerequisite: senior standing; admission to honors program. Staff.

Supervised reading and research on the problem selected for honors work.

ASIAN 4402 Asian Studies Honors: Senior Essay

Fall or spring. 4 credits. Prerequisite: admission to honors program. Staff.

The student, under faculty direction, prepares an honors essay.

ASIAN 4403–4404 Asian Studies Supervised Reading

Fall, spring, or both. 1–4 credits. Prerequisite: permission of instructor; majors and other qualified students.

Intensive reading under the direction of a member of the staff.

Bengali**BENGL 1121–1122 Elementary Bengali**

1121, fall; 1122, spring. 4 credits each semester. Prerequisite: for BENGL 1122, BENGL 1121 or examination. Letter grades only. S. Mukherjee.

For beginners, provides a thorough grounding in conversational, reading, and writing skills. An interactive videoconference course.

BENGL 2201–2202 Intermediate Bengali @

2201, fall; 2202, spring. 4 credits each semester. *BENGL 2201 satisfies Option 1.* Prerequisites: for BENGL 2201, BENGL 1122 or examination; for BENGL 2202, BENGL 2201 or examination. Letter grades only. S. Mukherjee.

Continuing focus on reading, writing and conversational skills, this course is designed to advance students' oral competence and enhance comprehension skills through reading, conversations, and listening.

[BENGL 2203–2204 Intermediate Bengali II: Composition and Conversation

2203, fall; 2204, spring. 2 credits each semester. Prerequisites: for BENGL 2203, BENGL 2202 or examination; for BENGL 2204, BENGL 2203 or examination. Letter grades only. S. Mukherjee.

Continuing instruction in Bengali at the higher intermediate level with a focus on conversations, discussions, and writing skills.]

BENGL 3301–3302 Advanced Bengali @

3301, fall; 3302, spring. 4 credits. *BENGL 3301 satisfies Option 1.* S. Mukherjee.

Continuing instruction in Bengali at the advanced level focusing on conversation, interview and writing skills.

[BENGL 3303–3304 Bengali Literature I, II @

3303, fall; 3304, spring. 4 credits each semester. Prerequisites: BENGL 2203–2204 or equivalent. *BENGL 3303 satisfies Option 1.* Letter grades only. S. Mukherjee.

Designed in consultation with students to address their specific needs. Through reading literary texts organized around social and cultural theme-clusters, the course aims to

refine the students' breadth of understanding and develop literary/critical skills.]

BENGL 4431–4432 Directed Study

4431, fall; 4432, spring. 1–4 credits, variable. Prerequisite: permission of instructor. Letter grades only. S. Mukherjee. Intended for advanced language study.

Burmese

Note: Contact S. Tun in 405 Morrill Hall before classes begin for placement or other testing and organizational information.

BURM 1121–1122 Elementary Burmese

1121, fall; 1122, spring. 4 credits each semester. Prerequisites: for BURM 1122, BURM 1121. Letter grades only. S. Tun.

A thorough grounding is given in all language skills: listening, speaking, reading, and writing.

BURM 2201–2202 Intermediate Burmese Reading @

2201, fall or spring; 2202, fall or spring. 3 credits each semester. *BURM 2201 satisfies Option 1.* Prerequisites: for BURM 2201, BURM 1122; for BURM 2202, BURM 2201. Letter grades only. S. Tun.

Continuing instruction in Burmese. For consolidating and extending skills acquired at the elementary level in both spoken and written Burmese, and for strengthening the understanding of literary Burmese.

BURM 2203–2204 Intermediate Burmese I and II @

2203, fall or spring; 2204, fall or spring. 3 credits each semester. *BURM 2203 satisfies Option 1.* Prerequisites: for BURM 2203, BURM 2202; for BURM 2204, BURM 2203 or by examination. Letter grades only. S. Tun.

Continuing instruction in Burmese at the higher intermediate level with a focus on improving oral expression, reading and interpretation of written texts, and further development of listening skills using language learning materials based on authentic audio-video clips.

BURM 3301–3302 Advanced Burmese @

3301, fall or spring; 3302, fall or spring. 3 credits each semester. Prerequisites: for BURM 3301, BURM 2202 or permission of instructor; for BURM 3302, BURM 3301.

BURM 3301 satisfies Option 1. Letter grades only. S. Tun.

For further development of listening skills in Burmese with emphasis on enriching vocabulary, strengthening grammatical competence, and understanding various genres and styles of written Burmese, such as articles on current events, anecdotes, short stories, etc.

BURM 4431–4432 Directed Study

4431, fall; 4432, spring. 1–4 credits variable. Prerequisite: permission of instructor. Letter grades only. S. Tun.

Intended for advanced language study.

Cambodian

See “Khmer.”

Chinese

Note: Testing for placement, including those with near-native abilities, takes place in registration week, before classes begin. Time and place will be posted at irc.cornell.edu/asian/programs/placement and on the bulletin board outside 350 Rockefeller Hall.

CHIN 1101-1102 Beginning Mandarin I and II

1101, fall; 1102, spring. 6 credits each semester. Limited to 12 students per sec. Prerequisite: for CHIN 1102, grade of C+ or higher in CHIN 1101, or permission of instructor. Students must enroll in lec and one sec. Because of limited sec size, students missing first two class meetings without university excuse are dropped so others may register. No students added after second week of classes. Letter grades only. S. Divo and staff.

For beginners only, providing a thorough grounding in conversational and reading skills. Students with some facility in the spoken language (because Chinese is spoken at home) but who do not read characters should take 1109-1110. Students who read Chinese, but who speak "dialects," such as Cantonese or Amoy, should enroll in CHIN 2215.

CHIN 1109-1110 Beginning Chinese Reading and Writing for Students of Chinese Heritage I and II

1109, fall; 1110, spring. 4 credits each semester. Students who complete CHIN 1110 normally continue with CHIN 2209 and 2210. Because of high demand, students missing first two meetings without university excuse are dropped so others may register. Letter grades only. Y. Lee-Mehta and staff.

Intended primarily for students who speak some Chinese (e.g., at home), but who have had little or no formal training. The focus is on characters, reading comprehension, basic composition, standard grammar, and reading aloud with standard Chinese (Mandarin) pronunciation.

CHIN 1111-1112 Elementary Cantonese I and II

1111, fall; 1112, spring. 4 credits each semester. Prerequisite: for CHIN 1111, none; for CHIN 1112, CHIN 1111 or equivalent. Students with Mandarin background should consult with instructor for enrollment. Letter grades only. H. Huang.

CHIN 1111 is for beginners with no or very limited Chinese/Cantonese language background from heritage or previous formal training. CHIN 1111/1112 gives basic training in oral/aural Cantonese spoken and used in Guangzhou and Hong Kong. CHIN 1112 gives some basic training in reading Cantonese characters besides the training in oral/aural Cantonese. For more details, see lrc.cornell.edu/asian/courses/ch/chin111 and lrc.cornell.edu/asian/courses/ch/chin112.

CHIN 2201-2202 Intermediate Mandarin I and II @

2201, fall or summer; 2202, spring or summer. 4 credits each semester. *CHIN 2201 satisfies Option 1.* Prerequisites: for CHIN 2201, CHIN 1102 with grade of B- or above or CHIN 1160 with grade of B or above or equivalent as determined through placement exam; for CHIN 2202, CHIN 2201 or equivalent. Letter grades only. Q. Teng and staff.

Continuing instruction in written and spoken Chinese with particular emphasis on consolidating basic conversational skills and improving reading confidence and ability.

CHIN 2209-2210 Intermediate Chinese Reading and Writing for Students of Chinese Heritage I and II @

2209, fall; 2210, spring. 4 credits each semester. *CHIN 2209 satisfies Option 1.* Prerequisites: for CHIN 2209, a grade of B in CHIN 1110 or equivalent as determined through placement exam; CHIN 2210, CHIN 2209. Letter grades only. Staff.

Continuing focus on reading and writing for students with spoken background in standard Chinese; introduction of personal letter writing and other types of composition.

CHIN 2211-2212 Intermediate Cantonese I and II @

2211, fall; 2212, spring. 4 credits each semester. *CHIN 2211 satisfies Option 1.* Prerequisites: for 2211, CHIN 1112 or equivalent, or elementary conversational skills in Cantonese from heritage or previous formal training in Cantonese; for 2212, CHIN 2211 or equivalent. Mandarin speakers should consult with instructor for enrollment. Letter grades only. H. Huang.

Gives comprehensive training in oral and written Cantonese at a higher level than CHIN 1111-1112. Oral training covers conversational Cantonese expression on daily life topics with more vocabulary and more sophisticated sentence structures. Written training includes reading with proper Cantonese pronunciation and writing Cantonese characters. For more details, see lrc.cornell.edu/asian/courses/ch/chin211 and lrc.cornell.edu/asian/courses/ch/chin212.

CHIN 2213-2214 High Intermediate Cantonese I and II @

2213, fall; 2214, spring. 4 credits each semester. *CHIN 2213 satisfies Option 1.* Prerequisite: for 2213, basic oral/aural and written skill in Cantonese and intention to continue the learning of Cantonese both oral and written, or completion of CHIN 2212; Prerequisite for 2214: 2213 or equivalent. Letter grades only. H. Huang.

CHIN 2213: A course primarily for students who have acquired basic oral/aural and written skill in Cantonese and have the interest to continue learning speaking Cantonese and reading and writing Cantonese characters; CHIN 2214: A course primarily for students who have the interest to raise their oral and written Cantonese to a higher level. For more detail, see lrc.cornell.edu/asian/courses/ch/chin213 and lrc.cornell.edu/asian/courses/ch/chin214.

CHIN 2215 Mandarin for Cantonese Speakers @

Fall. 4 credits. *Satisfies Option 1.* Limited to 15 students. Prerequisite: advanced Cantonese with native-like reading and writing ability. Letter grades only. Staff.

Works on standard Chinese pronunciation and differences in vocabulary and grammar between Cantonese and Mandarin.

CHIN 3301-3302 High Intermediate Mandarin I and II @

3301, fall; 3302, spring. 4 credits each semester. *CHIN 3301 satisfies Option 1.* Prerequisites: for CHIN 3301, grade of B+ or higher in CHIN 2202, or equivalent as determined through placement exam; for CHIN 3302, CHIN 3301. Letter grades only. Y. Lee-Mehta.

Continuing instruction in spoken Chinese and in various genres and styles of written Chinese.

[CHIN 3306 Readings in Chinese History, Culture and Society (also CAPS 3060) @

Spring. 4 credits. Next offered 2010-2011. Z. Chen.

Designed for CAPS majors to enhance Chinese proficiency while preparing them for studying in a Chinese-language setting.]

CHIN 3309/3310 Business Chinese in Cultural Context I (also CHIN 5509/5510) @

Fall, spring. 4 credits each semester. *CHIN 3309 satisfies Option 1.* Prerequisite: two years of Chinese and permission of instructor only. Letter grades only. Z. Chen.

First part of a two-semester sequence for those who studied Mandarin to advanced level. Will cover first five chapters of the textbook, developed surrounding five real cases. These are multinational companies, successfully operated in China by adapting their strategies to special needs of the Chinese market. By reading, discussing, and performing communicative tasks related to those cases, students will learn how to use Chinese as a "carrier of culture," acquiring a better understanding of China in economic and cultural terms. To expand students' knowledge on various business-related issues, in addition to business case analysis, supplementary reading, writing and listening exercises as well as clips of TV shows and interviews will also be provided. Highlights are: Listening comprehension of business news reports; translation of business terms and documents; discussion of Chinese business laws, commercial language and word processing. Class will be in Chinese.

CHIN 3341 High Intermediate Mandarin: CAPS in D.C. @

Fall. 4 credits. Letter grades only. Staff. For description, see CHIN 3301.

CHIN 4411-4412 Advanced Mandarin I and II @

4411, fall; 4412, spring. 4 credits each semester. *CHIN 4411 satisfies Option 1.* Prerequisites: for CHIN 4411, grade of B+ or higher in CHIN 3302, or equivalent as determined through placement exam; for CHIN 4412, grade of B+ or higher in CHIN 4411 or permission of instructor. Letter grades only. Q. Teng.

Reading, discussion, and composition at advanced levels.

[CHIN 4425 Special Topics (also CHIN 6625) @

Spring. 4 credits. Prerequisite: permission of instructor. Letter grades only. Next offered 2010-2011. Staff.]

CHIN 4426 Historical Documents on Modern China (also CHIN 6626, HIST 4650/6650) @

Fall. 4 credits. Prerequisite: permission of instructor. Z. Chen.

For description, see HIST 4650.

CHIN 4427-4428 High Advanced Mandarin I and II @

4427, fall; 4428, spring. *CHIN 4427 satisfies Option 1.* 4 credits each semester. Prerequisite: for CHIN 4427, grade of B+ or higher in CHIN 2210 or CHIN 4412, or equivalent as determined through placement exam; for CHIN 4428, grade of B+ or higher in CHIN 4427 or permission of instructor. Letter grades only. W. Shao. The focus of the course is on formal Chinese, and the main aim of this course is to help

students achieve an advanced level of Chinese performance, so they may combine Chinese with their work in their majors.

CHIN 4431-4432 Directed Study

4431, fall; 4432, spring. 1-4 credits, variable. Prerequisite: permission of instructor. Staff.

Intended for advanced language study.

CHIN 4441 Advanced Mandarin: CAPS in D.C. @

Fall. 4 credits. Letter grades only. Staff. For description, see CHIN 4411.

CHIN 4445 Directed Study: CAPS in D.C.

Fall. 1-4 credits. Letter grades only. Staff. For description, see CHIN 4431-4432.

CHIN 4451 Advanced Mandarin: CAPS in Beijing @

Fall. 4 credits. Letter grades only. Staff. For description, see CHIN 4411.

CHIN 4455 Directed Study: CAPS in Beijing

Fall. 1-4 credits. Letter grades only. Staff. For description, see CHIN 4431-4432.

CHIN 4457 High Advanced Mandarin: CAPS in Beijing @

Fall. 3 credits. *CHIN 4457 satisfies Option 1.* Letter grades only. Staff. For description, see CHIN 4427.

CHIN 5509-5510 Business Chinese in Cultural Context I (also CHIN 3309-3310)

Fall, spring. 4 credits each semester. Letter grades only. Z. Chen. For description, see CHIN 3309-3310.

[CHIN 6625 Special Topics (also CHIN 4425)]

Fall. 4 credits. Prerequisite: permission of instructor. Letter grades only. Next offered 2010-2011. Staff.]

CHIN 6626 Historical Documents on Modern China (also CHIN 4426, HIST 4650/6650)

Fall. 4 credits. Prerequisite: permission of instructor. Z. Chen. For description, see HIST 4650.

Chinese FALCON (Full-Year Asian Language CONcentration)

For full information, brochures, etc., see the FALCON Program coordinator in 388 Rockefeller Hall or e-mail: falcon@cornell.edu or lrc.cornell.edu/falcon

FALCON is designed to help students develop "copability" in Mandarin Chinese by bringing them to the level where they can make progress on their own even with no further instruction. The full-year program provides over 1,800 hours of language exposure—which exceeds even the exposure that students living in China typically receive. This allows students to develop levels of fluency, accuracy, and control that are not achieved in other academic settings. By taking the entire full-year sequence, students can complete as much Chinese in one calendar year as they would complete in three or more years of regular study at most academic institutions. The full-year sequence is CHIN 1159 or 1160 (summer), 2260 (fall), and 3360 (spring). Students typically take the entire sequence, but they may take any portion of the program if they have the necessary background as determined by a placement interview. This

course sequence also serves to fulfill the language requirement for the M.A. in Asian Studies and the joint M.B.A./M.A. in Asian Studies. For more information and application forms, please contact the FALCON program office. Some students do choose to apply only to the summer portion. The spring semester of the Chinese program will be offered in Beijing at the School of International Studies at Peking University. In the summer and fall, three small interactive classes per day are conducted entirely in Chinese, and one lecture is conducted in both Chinese and English. In the spring semester, all four classes are conducted entirely in Chinese. In the summer and fall, students are also required to spend at least two one-hour sessions per day in the language lab. Additional preparation time in the language lab of up to three hours is necessary in the evenings. The demands of this 16-credit program do not normally permit students to take other courses simultaneously.

Students must formally apply to the program. To guarantee course availability and scholarship eligibility, applications must be received by March 1. After that, applicants are reviewed on a rolling basis and acceptance is contingent on the availability of spaces. Applications are available in 388 Rockefeller Hall or at lrc.cornell.edu/falcon/apply.

CHIN 1159 Summer Intensive Chinese (FALCON)

Summer only. 1-7 credits. Prerequisite: some previous language study in Chinese; permission of program director. S. Divo and staff.

This course is for students with significant prior background in Chinese who take CHIN 1160 for fewer than 8 credits. Formal application and a placement interview are required.

CHIN 1160 Introductory Intensive Mandarin (FALCON)

Summer only. 8 credits. Students who complete this course with grade of at least B are normally eligible to enroll in CHIN 2201. S. Divo and staff.

This is a nine-week intensive, 8-credit course that meets only in the summer, Monday through Friday from 8:30 a.m. to 4:30 p.m., beginning from an absolutely introductory level introducing the spoken and written language. Lectures on linguistics and cultural matters, intensive practice with native speakers, and laboratory work prepare students for an intermediate level of study. This course involves work on all four skills: speaking, listening comprehension, reading and writing. Students who complete this course with a grade of B or higher are normally eligible to enroll in CHIN 2201, if they choose not to continue to CHIN 2260.

CHIN 2260 Intermediate Intensive Mandarin (FALCON) @

Fall. 16 credits. *Satisfies Option 1.* Prerequisites: grade of B+ in CHIN 1160 or equivalent with permission of instructor. Students must apply formally to FALCON program; open to all Cornell students and students from other institutions. S. Divo and staff.

Students work on spoken and written Chinese at the intermediate level, developing fluency, accuracy, and control that are not achieved in other academic settings. This is a full-time academic program that meets Monday through Friday from 9:05 a.m. to 4:30 p.m., with 1-3

hours per day of self-directed practice in Cornell's Language Resource Center.

CHIN 3360 Advanced Intensive Mandarin (FALCON) @

Spring. 16 credits. Prerequisite: grade of B+ or higher in CHIN 2260 or permission of instructor. CHIN 3360 is scheduled to be held in Beijing, People's Republic of China. S. Divo and staff.

After finishing the summer and fall terms at Cornell, students have the language skills to benefit fully from a Chinese linguistic and cultural environment. FALCON's full-year students spend their last semester in Beijing, where they continue to improve their skills and put them to effective use in daily life. In Beijing, students continue to attend four small-group classes with FALCON-trained Chinese language teachers; these classes include comprehensive training to develop reading, writing, and speaking proficiency, a course in newspaper reading and translation, as well as a course in advanced listening skills. In addition, a variety of activities outside the classroom, including field trips and guest lectures are provided. Spring FALCON is scheduled at the School of International Studies at Peking University.

Literature in Chinese

CHLIT 2213-2214 Introduction to Classical Chinese @ # (LA-AS)

2213, fall; 2214, spring. 3 credits each semester. *CHLIT 2213-2214 does NOT satisfy Option 1.* Prerequisite: for 2213, qualification in Chinese or permission of instructor; for 2214, 2213 or permission of instructor. May be taken concurrently with CHIN 1101-1102, 2201-2202, 3301-3302. Open to students who have studied at least two years of any language that employs Chinese writing system (e.g., Mandarin, Cantonese, Japanese). D. X. Warner and B. Rusk.

Two-part introductory course. Students learn the fundamental grammar and vocabulary of classical Chinese by analyzing and translating short passages. (LL)

[CHLIT 3300 Reading from the Early Masters @ # (HA-AS)]

Spring. 4 credits. Prerequisites: CHLIT 2213-2214 or permission of instructor. Next offered 2010-2011. R. McNeal. Students read and discuss several passages from early classical texts, such as the Confucian Analects, the Mozi, the Guanzi, and others. Attention is paid to grammar, historical context, and methodology.]

[CHLIT 3307 Readings in Classical Chinese Literature @ # (LA-AS)]

Spring. 4 credits. Prerequisite: CHLIT 2214 or permission of instructor. Next offered 2010-2011. D. X. Warner and B. Rusk. This course surveys selected texts—primarily in prose—from the ancient and medieval periods. (LL)]

[CHLIT 4418 Medieval Chinese Narrative Tales @ # (LA-AS)]

Fall. 4 credits. Prerequisite: at least three years of Chinese language training and preferably one year classical Chinese. Next offered 2010-2011. D. X. Warner. This course introduces students to medieval Chinese narrative literature. (LL)]

CHLIT 4420 T'ang Poetry: Themes and Contexts (also CHLIT 6620) @ # (LA-AS)

Spring. 4 credits. Prerequisite: minimum three years of Chinese and/or one year of Classical Chinese or permission of instructor. D. X. Warner.

A guided reading in Chinese of selected works on shared themes written by selected poets of the T'ang dynasty (618-907). Focuses on developing the essential skills for reading T'ang poems while giving attention to their social, cultural, and historical contexts. (LL)

CHLIT 4421-4422 Directed Study

Fall or spring. 2-4 credits each semester.

Prerequisite: permission of instructor. Staff. Students choose a faculty member to oversee this independent study. The student and the faculty member work together to develop course content. (LL)

CHLIT 4423 Readings in Chinese History @

Spring. 4 credits. Prerequisites: equivalent of three years of Mandarin instruction; permission of instructor. *Satisfies Option 1.* Staff. (LL)

[CHLIT 4435 Chinese Buddhist Texts @ # (LA-AS)]

Fall. 4 credits. Prerequisite: one year of classical Chinese or permission of instructor. Open to students in any area of East Asia with an interest in developing skills in Buddhist texts. Next offered 2010-2011. D. Boucher. (LL)

[CHLIT 6603 Seminar in Chinese Fiction and Drama]

Fall. 4 credits. Prerequisite: permission of instructor. Next offered 2010-2011. E. Gunn. (LL)

CHLIT 6605 Seminar in Chinese Fiction and Drama

Fall. 4 credits. Prerequisite: permission of instructor. E. Gunn.

As a seminar, the course engages students in contemporary fiction and drama and published criticism of them in order to build the students' scholarly and critical abilities. Texts are in Chinese, with some criticism published in English. (LL)

[CHLIT 6610 Chinese Cultural Criticism]

Spring. 4 credits. Next offered 2010-2011. E. Gunn. (SC)

[CHLIT 6615 Seminar: Ideas and Literature of Medieval China]

Spring. 4 credits. Next offered 2010-2011. D. X. Warner. (LL)

[CHLIT 6620 T'ang Poetry: Themes and Contexts (also CHLIT 4420)]

Fall. 4 credits. Prerequisite: minimum three years of Chinese and/or one year of Classical Chinese or permission of instructor. Next offered 2010-2011. D. X. Warner.

For description, see CHLIT 4420. (LL)

CHLIT 6621-6622 Advanced Directed Reading: Chinese Historical Syntax

6621, fall; 6622, spring. 2-4 credits. Prerequisite: permission of instructor. Staff. Students choose a faculty member to oversee this independent study. The student and the faculty member work together to develop class readings. (LL)

Hindi**HINDI 1101-1102 Introductory Hindi I and II**

1101, fall; 1102, spring. 6 credits each semester. *Students may not receive credit for both HINDI 1101 and 1109. Students may not receive credit for both HINDI 1102 and 1110.* Prerequisite: for HINDI 1102, HINDI 1101 or equivalent. Letter grades only. S. Singh and staff.

This is a course designed for a complete beginner in Hindi. Students are not expected to have any prior knowledge in Hindi before taking this course. In this course, they will learn how to read and write Hindi script and how to speak survival Hindi in different social settings. While reading, writing, and listening are very important components of this course, much emphasis is put on spoken Hindi.

HINDI 1109-1110 Accelerated Hindi I and II

1109, fall; 1110, spring. 4 credits each semester. *Students may not receive credit for both HINDI 1101 and 1109. Students may not receive credit for both HINDI 1102 and 1110.* Prerequisite: for HINDI 1109, background in Hindi or permission of instructor; for HINDI 1110, HINDI 1109 or equivalent. Check with instructor regarding placement. Letter grades only. S. Singh and staff.

Accelerated Hindi is a course designed for heritage students. Students develop fluency and accuracy in all four language skills: reading, writing, listening and speaking. It is a parallel course of HINDI 1101, except it moves faster and the focus is on fluency and accuracy in the target language.

HINDI 2201-2202 Intermediate Hindi I and II @

2201, fall; 2202, spring. 4 credits each semester. *HINDI 2201 satisfies Option 1.* Prerequisites: for HINDI 2201, HINDI 1102 or HINDI 1110; for HINDI 2202, HINDI 2201 or permission of instructor. Letter grades only. S. Singh and staff.

This is an intermediate-level course in Hindi. Students' competence in all four language areas will become very strong and solid. This course will work on building up their confidence in describing complicated situations and ideas in the target language, reading and writing speed, and clarity in listening comprehension such as news, complicated descriptions, and other media contents.

HINDI 3301-3302 Advanced Hindi I and II @

3301, fall; 3302, spring. 3 credits each semester. *HINDI 3301 satisfies Option 1.* Prerequisites: for HINDI 3301, HINDI 2202; for HINDI 3302, HINDI 3301; or permission of instructor. Letter grades only. S. Singh and staff.

Selected readings in modern Hindi literature. Continued work on fluency in speaking Hindi on an advanced level. There will be a combination of different reading materials from literature, journals, newspapers and many social, entertainment, and political magazines in Hindi. Discussions will be based on those readings and articles, hence giving opportunities to express views and opinions in a fluent and effective manner.

HINDI 4431-4432 Directed Study

4431, fall; 4432, spring. 1-4 credits, variable. Prerequisite: permission of instructor. Letter grades only. S. Singh. Intended for advanced language study.

Indonesian**INDO 1121-1122 Elementary Indonesian**

1121, fall; 1122, spring. 4 credits each semester. Prerequisite: for INDO 1122, INDO 1121. Letter grades only. J. Pandin. Gives a thorough grounding in basic speaking, listening, and writing skills with an introduction to reading.

INDO 2205-2206 Intermediate Indonesian @

2205, fall; 2206, spring. 3 credits each semester. *INDO 2205 satisfies Option 1.* Prerequisites: for INDO 2205, INDO 1122 or equivalent; for INDO 2206, INDO 2205 or equivalent. Letter grades only. J. Pandin. Develops all four skills: reading, writing, speaking, and comprehension.

INDO 3301-3302 Advanced Indonesian @

3301, fall; 3302, spring. 3 credits each semester. *INDO 3301 satisfies Option 1.* Prerequisite: INDO 2206 or equivalent. Letter grades only. J. Pandin. Practical language course on an advanced level in which students read selected materials on current issues, write reports, and make oral presentations.

INDO 4431-4432 Directed Study

4431, fall; 4432, spring. 1-4 credits, variable. Prerequisite: permission of instructor. Letter grades only. J. Pandin. Intended for advanced language study.

Japanese**JAPAN 1101-1102 Elementary Japanese I and II**

1101, fall; 1102, spring. 6 credits each semester. Prerequisite for 1102: JAPAN 1101 or placement by instructor during registration period. Intended for beginners or those who have been placed in the course by examination. Students must enroll in one lec and one sec. Letter grades only. M. Suzuki and staff.

Gives a thorough grounding in all four language skills—speaking, listening, reading, and writing—at the beginning level. The lecture provides explanation, analysis, and cultural background. Sections are conducted entirely in Japanese.

JAPAN 2201-2202 Intermediate Japanese I and II @

2201, fall; 2202, spring. 4 credits each semester. *JAPAN 2201 satisfies Option 1.* Prerequisites: for JAPAN 2201, JAPAN 1102 or placement by instructor during registration; for JAPAN 2202, JAPAN 2201 or placement by instructor during registration. Students must enroll in lec and one sec. Letter grades only. Y. Katagiri.

This course provides widely applicable language proficiency as an integrated Japanese course, which develops all four language skills (speaking, listening, reading, and writing) at the post-elementary level. Discussion sections are conducted entirely in Japanese to give opportunities to practice socioculturally appropriate language performances while enhancing listening comprehension and speaking ability through realistic situational

practices, in addition to training in practical reading and writing skills. Lectures systematically demonstrate versatile knowledge of essential structural patterns with audio-visual aides and explain cultural background and customs useful for effective oral and written communication.

JAPAN 3301-3302 Continuing Intermediate Japanese I and II @

3301, fall; 3302, spring. 4 credits each semester. *JAPAN 3301 satisfies Option 1.* Prerequisites: for JAPAN 3301, JAPAN 2202 or placement by instructor during registration; for JAPAN 3302, JAPAN 3301 or placement by instructor during registration. Letter grades only. S. Ichikawa. For students who have learned basic Japanese skills and would like to develop higher skills in listening, speaking, reading, and writing.

JAPAN 4401-4402 Advanced Japanese I and II

4401, fall; 4402, spring. 4 credits each semester. *JAPAN 4401 satisfies Option 1.* Prerequisites: for JAPAN 4401, JAPAN 3306 or placement by instructor during registration; for JAPAN 4402, JAPAN 4401 or placement by instructor during registration. Letter grades only. N. Larson. Develops all four language skills (speaking, listening, reading, and writing) at the advanced level.

JAPAN 4410 History of the Japanese Language (also ASIAN/LING 4411) @ # (HA-AS)

4 credits. Prerequisite: permission of instructor. J. Whitman. For description, see LING 4411.

JAPAN 4421-4422 Special Topics @

4421, fall; 4422, spring. 4 credits. Prerequisites, for JAPAN 4421, JAPAN 4402 or placement by instructor during registration; for JAPAN 4422, JAPAN 4421 or placement by instructor during registration. *JAPAN 4421 satisfies Option 1.* Letter grades only. M. Chapman. Intended for advanced students or placement by instructor. Advanced readings with discussion about a particular topic.

JAPAN 4431-4432 Directed Study

4431, fall; 4432, spring. 1-4 credits each semester. Prerequisite: permission of instructor. Letter grades only. Staff. Intended for advanced language study.

Japanese FALCON (Full-Year Asian Language Concentration)

Web site: lrc.cornell.edu/falcon.

Director: R. Sukle, 388 Rockefeller Hall, 255-0734 or rjs19@cornell.edu.

Program coordinator: 388 Rockefeller Hall, 255-6457 or falcon@cornell.edu.

FALCON is designed to develop "copability" in students by bringing them to the level where they can make further progress on their own even with no further instruction. The full-year program provides over 1,800 hours of language exposure—which exceeds even the exposure that students living in Japan typically receive. This intensive work in Japanese allows students to develop levels of fluency, accuracy, and control of the language that is not achieved in any other type of academic setting. The full-year FALCON sequence is Japanese 1160 (summer), 2260 (fall), and 3360 (spring). By taking this entire sequence,

students can complete as much Japanese in one calendar year as they would complete in three or more years of regular study at most academic institutions. This course sequence also serves to fulfill the language requirement for the M.A. in Asian Studies and the joint M.B.A./M.A. in Asian Studies. For more information and application forms, please contact the FALCON program office. Because of FALCON's intensive nature, graduate students can complete their language work in minimal time. Undergraduates, including freshmen, achieve levels of competency that far exceed what is normally achieved in a four-year program, provided that they continue studying Japanese after FALCON. Three small interactive classes per day are conducted entirely in Japanese, and one lecture is conducted in both Japanese and English. The interactive classes are conducted by experienced and highly trained teachers, and the lecture is taught by an expert in the structure of the Japanese language. In addition to time spent in these classes, students are required to spend at least two one-hour sessions per day in the language lab. Additional preparation time in the language lab of up to three hours is necessary in the evenings. One must formally apply to the program to take the courses. The deadline for application is March 1 in a given year, but applications will be considered after that date if space is still available. The degree of intensity of this program makes it impossible to simultaneously take other courses or work except possibly on weekends.

JAPAN 1159 Summer Intensive Japanese (FALCON)

Summer only. 1-7 credits. Prerequisite: permission of program director; some previous language study in Japanese. Applications must be received by March 1. After the deadline, applications are considered provided that space is available. R. Sukle and staff.

This course is for students with significant prior background in Japanese who take JAPAN 1160 for fewer than 8 credits. Formal application and a placement interview are required.

JAPAN 1160 Introductory Intensive Japanese (FALCON)

Summer only. 8 credits. Formal application to FALCON is required. Admission is open to all students, not just those planning to take the full year. Students from other institutions are also welcome to apply. Applications must be received by March 1. After the deadline, applications are considered provided that space is available. R. Sukle and staff.

This is a nine-week intensive, 8-credit course that meets only in the summer, Monday through Friday from 8:30 a.m. to 4:30 p.m., beginning from an absolute introductory level introducing the spoken and written language. Lectures on linguistics and cultural matters, intensive practice with native speakers, and laboratory work prepare students for an intermediate level of study. This course involves work on all four skills: speaking, listening comprehension, reading and writing. Students who successfully complete this course and plan to continue at Cornell may take the fall and spring FALCON courses (JAPAN 2260 and 3360). Students interested in other options for continuing after FALCON should consult the FALCON director, Robert Sukle, at rjs19@cornell.edu or 255-0734.

JAPAN 2260 Intermediate Intensive Japanese (FALCON) @

Fall. 16 credits. *Satisfies Option 1 or Option 2.* Prerequisites: JAPAN 1160, JAPAN 1102 at Cornell, or placement by FALCON staff before beginning of fall semester. Formal application to FALCON is required. Admission is open to all students, including those from other institutions. Applications must be received by March 1. After the deadline, applications are considered provided that space is available. R. Sukle and staff.

Students work on spoken and written Japanese at the intermediate level, allowing students to develop fluency, accuracy, and control that are not achieved in other academic settings. This is a full-time academic program that meets Monday through Friday from 9:05 a.m. to 4:30 p.m., with one to three hours per day of self-directed practice in Cornell's Language Resource Center.

JAPAN 3360 Advanced Intensive Japanese (FALCON) @

Spring. 16 credits. Prerequisite: JAPAN 2201 at Cornell or placement by FALCON staff. R. Sukle and staff.

Students work on spoken and written Japanese from an intermediate to an advanced level, allowing students to develop fluency, accuracy, and control. The material is more complicated with practice on switching levels of politeness (formal to informal). There is great emphasis on eliciting from students complex explanations and narratives rather than one-sentence answers. By the end of the term students are able to speak in paragraph-length utterances. More emphasis is placed on application and vocabulary acquisition, allowing students to deal with natural, social interactions and to begin explaining ideas. After the texts are finished, students begin reading authentic publications from Japan aimed at a native Japanese reader, learning to discuss the contents of what they have read in Japanese.

Literature in Japanese

[JPLIT 4406 Introduction to Classical Japanese @ #

Fall. 4 credits. Prerequisite: JAPAN 4402 or permission of instructor. Next offered 2010-2011. J. Kanemitsu.

Introduction to the fundamental grammar and vocabulary of classical Japanese. (LL)]

[JPLIT 4408 Readings in Classical Japanese @ #

Spring. 4 credits. *Satisfies Option 1.* Prerequisite: JPLIT 4406 or permission of instructor. Next offered 2010-2011. J. Kanemitsu.

Readings of excerpts and complete brief pieces from representative premodern Japanese literature mostly with the use of standard modern annotated editions. (LL)]

[JPLIT 6617 Modern Japanese Philosophy

Fall. 4 credits. Next offered 2010-2011. N. Sakai.

Seminar on modern Japanese philosophy. Students are expected to read texts in Japanese and discuss epistemic, historical, and practical issues involved in them. Supplementary reading of European and U.S. philosophical texts is also required. (LL)]

[JPLIT 6618 Japanese Philosophical Discourse II

Spring, 4 credits. Prerequisite: reading knowledge of Japanese. Next offered 2010-2011. N. Sakai. (LL)

JPLIT 6625 Directed Readings

Fall or spring, 4 credits. Staff. Students choose a faculty member to oversee this independent study. The student and the faculty member work together to develop class readings. (LL)

JPLIT 6627-6628 Advanced Directed Readings

6627, fall; 6628, spring, 1-4 credits. Prerequisite: permission of instructor. Staff.

Khmer (Cambodian)**KHMER 1121-1122 Elementary Khmer I and II**

1121, fall; 1122, spring, 4 credits each semester. Prerequisite: for KHMER 1122, KHMER 1121; for beginners or those placed in course by examination. Letter grades only. H. Phan.

Gives a thorough grounding in speaking and reading.

KHMER 2201-2202 Intermediate Khmer Reading I and II @

2201, fall; 2202, spring, 3 credits each semester. *KHMER 2201 satisfies Option 1.* Prerequisites: for KHMER 2201, KHMER 1122; for KHMER 2202, 2201. Letter grades only. H. Phan.

Continuing instruction in spoken and written Khmer. Intermediate level of reading Khmer.

KHMER 2203-2204 Intermediate Composition and Conversation I and II @

2203, fall; 2204, spring, 3 credits each semester. *KHMER 2203 satisfies Option 1.* Prerequisites: for KHMER 2203, KHMER 1122; for KHMER 2204, 2203. Letter grades only. H. Phan.

KHMER 3301-3302 Advanced Khmer I and II @

3301, 3302, fall, 4 credits each semester. *KHMER 3301 satisfies Option 1.* Prerequisites: for KHMER 3301, KHMER 2202 or equivalent; for KHMER 3302, 3301. Letter grades only. H. Phan.

Continuing instruction in spoken and written Khmer; emphasis on enlarging vocabulary, increasing reading speed, and reading various genres and styles of prose.

KHMER 4431-4432 Directed Study

4431, fall; 4432, spring, 1-4 credits variable. Prerequisite: permission of instructor. Letter grades only. H. Phan. Intended for advanced language study.

Korean**KOREA 1101-1102 Elementary Korean I and II**

1101, fall; 1102, spring, 6 credits each semester. Prerequisites: for KOREA 1101, none; for KOREA 1102, KOREA 1101 or placement by instructor. *Students may not receive credit for both KOREA 1101 and KOREA 1109. Students may not receive credit for both KOREA 1102 and 1110.* Letter grades only. M. Song.

Covers basics of speaking, reading, and writing. Introduces Hangeul writing system and grammar.

KOREA 1109-1110 Elementary Korean Reading and Writing I and II

1109, fall; 1110, spring, 4 credits each semester. Prerequisites: for KOREA 1109, placement by instructor; for KOREA 1110, KOREA 1109 or placement by instructor. If in doubt about eligibility, see instructor. *Students may not receive credit for both KOREA 1101 and KOREA 1109. Students may not receive credit for both KOREA 1102 and 1110.* Letter grades only. M. Song.

For students who have spoken some Korean in the home, but whose reading and writing skills are limited or nonexistent.

KOREA 2201-2202 Intermediate Korean I and II @

2201, fall; 2202, spring, 4 credits each semester. *KOREA 2201 satisfies Option 1.* Prerequisites: for KOREA 2201, KOREA 1102 or placement by instructor; for KOREA 2202, 2201. Letter grades only. Staff.

Continuing instruction in written and spoken Korean with emphasis on consolidating basic conversational skills and improving reading ability and confidence.

KOREA 2209-2210 Intermediate Korean Reading and Writing I and II @

2209, fall; 2210, spring, 4 credits each semester. *KOREA 2209 satisfies Option 1.* Prerequisites: for KOREA 2209, KOREA 1110 or placement by instructor; for KOREA 2210, 2209 or placement by instructor. If in doubt about eligibility, see instructor. Letter grades only. Staff.

Intermediate level of reading comprehension and writing course for students who have acquired basic written proficiency. Introduces some reading and writing with Chinese characters.

KOREA 3301-3302 High Intermediate Korean I and II @

3301, fall; 3302, spring, 4 credits each semester. *KOREA 3301 satisfies Option 1.* Prerequisites: for KOREA 3301, KOREA 2202 or KOREA 2210, or placement by instructor; for KOREA 3302, 3301 or placement by instructor. Letter grades only. Staff.

Continuing instruction in Korean with emphasis upon spoken fluency and reading various materials including newspapers.

KOREA 4401-4402 Advanced Korean I and II @

4401, fall; 4402, spring, 4 credits. *KOREA 4401 satisfies Option 1.* Prerequisite: for KOREA 4401, KOREA 2210 or KOREA 3302 or placement by instructor; for KOREA 4402, KOREA 4401 or placement by instructor. Letter grades only. M. Song.

Develops all four language skills (speaking, listening, reading and writing) through discussion and composition at the advanced level.

KOREA 4425 Special Topics @

Fall, 4 credits. *KOREA 4425 satisfies Option 1.* Prerequisite: Fluency in Korean and permission of instructor. Letter grades only. Taught in Korean. J. Pak.

In-depth examination of topics on Korea.

[KOREA 4430 Structure of Korean (also ASIAN/LING 4430) (KCM-AS)

Spring, 4 credits. Next offered 2010-2011. J. Whitman.

For description, see LING 4430.]

KOREA 4431-4432 Directed Study

4431, fall; 4432, spring, 1-4 credits, variable. Prerequisite: permission of instructor. Letter grades only. Staff. Intended for advanced language study.

Literature in Korean**[KRLIT 4432 Middle Korean (also LING 4432) @ # (LA-AS)**

Spring, 4 credits. Prerequisite: KOREA 3301 or equivalent. Next offered 2010-2011.

J. Whitman.

For description, see LING 4432. (LL)]

Nepali**The Cornell Nepal Study Program**

Cornell and the central campus of Tribhuvan National University (in Kirtipur, Kathmandu) cosponsor a semester or year in Nepal at the Cornell Nepal Study Program for both undergraduate and graduate students. North American students live and study with Nepali students at the Cornell program houses near the university, taking courses taught in English by faculty from Tribhuvan University. After an intensive orientation, semester courses include intensive spoken and written Nepali language, Contemporary Issues in Nepal, and Research Design and Methods in a wide variety of fields in the social and natural sciences and the humanities. (Language instruction in Tibetan and Newari may also be arranged.) There is a 10-day study tour and field trip during the semester, and students execute their research proposal during four weeks of guided field research, writing up their findings for presentation at the end of the semester.

Juniors, seniors, and graduate students from any field may apply. Students should have a desire to participate in a program featuring relatively intense cultural immersion and to undertake rigorous field research. Instruction is in English, but prior study of Nepali language is strongly recommended for Cornell students. Those interested in the program should consult Cornell Abroad (cuabroad@cornell.edu).

NEPAL 1101-1102 Elementary Nepali I and II

1101, fall; 1102, spring; 1101-1102, summer, 6 credits each semester.

Prerequisite: for NEPAL 1102, NEPAL 1101 or examination. Letter grades only. S. Oja. Intended for beginners. The emphasis is on basic grammar, speaking, and comprehension skills, using culturally appropriate materials and texts. Devanagari script for reading and writing is also introduced.

NEPAL 2201-2202 Intermediate Nepali Conversation I and II @

2201, fall; 2202, spring; 2201-2202, summer, 3 credits each semester. *NEPAL 2201 satisfies Option 1.* Prerequisites: for NEPAL 2201, NEPAL 1102 or examination; for NEPAL 2202, 2201 or examination.

Letter grades only. S. Oja.

Intermediate instruction in spoken grammar and verbal comprehension skills, with special attention to developing technical vocabularies and other verbal skills appropriate to students' professional fields.

NEPAL 2203-2204 Intermediate Nepali Composition I and II @

2203, fall; 2204, spring; 2203-2204, summer. 3 credits each semester. *NEPAL 2203 satisfies Option 1.* Prerequisites: for NEPAL 2203, NEPAL 1102 or examination; for NEPAL 2204, 2203 or examination. Letter grades only. S. Oja.

Systematic review of written grammar and reading comprehension, with special attention to the technical vocabularies, necessary writing skills, and published materials typical of advanced students' professional fields.

NEPAL 3301-3302 Advanced Nepali I and II @

3301, fall; 3302, spring; 3301-3302, summer. 3 credits each semester. *NEPAL 3301 satisfies Option 1.* Prerequisite: NEPAL 2204 or permission of instructor. Letter grades only. S. Oja.

Reading of advanced texts, together with advanced drill on the spoken language.

NEPAL 4431-4432 Directed Study

4431, fall; 4432, spring. 1-4 credits, variable. Letter grades only. S. Oja.

Permission of instructor needed. Intended for advanced language study.

Intensive Nepali

Nepali, the official language of Nepal, will be offered in the Summer Session at both beginning and continuing levels. Taught by faculty from Cornell University and the Cornell-Nepal Study Program at Tribhuvan University, this summer program provides an unusual opportunity to develop competence in Nepali. Emphasis will be on the spoken colloquial language, in dialogues, exercises, and conversational practice. In addition, special attention is given to assisting students in developing vocabularies and skills appropriate to their unique professional needs. Reading and writing practice use both popular and scholarly materials in the Nepali (Devanagari) script. Students will spend five hours per day in class and two further hours working with recorded materials in addition to the time required for daily preparation. Films and guest lecturers complement the summer program. The program lasts six weeks and meets five days a week. Students must formally apply to the program. Applications are available at <http://irc.cornell.edu/asian/programs/summer/nepali> during the spring semester. For more information, etc., please see Kim Scott in 350 Rockefeller Hall or e-mail: kp16@cornell.edu.

NEPAL 1159 Summer Intensive Nepali

Summer only. 1-5 credits. Prerequisite: permission only. Students must formally apply. S. Oja and B. Oja.

For students who take NEPAL 1160 for fewer than 6 credits. It is a six-week intensive language course beginning at the absolute beginning level and going up to intermediate level. It includes work on all four language skills: speaking, listening comprehension, reading, and writing.

NEPAL 1160 Intensive Nepali

Summer only. 6 credits. Prerequisite: permission only. Students must formally apply. S. Oja and B. Oja.

This intensive study of Nepali provides an unusual opportunity to obtain basic competence in the language in one summer. Emphasis is upon the spoken (colloquial) language; although attention will also be given

to assisting the students develop vocabularies appropriate to their professional fields as well. Reading and writing practice will use both colloquial and scholarly materials in the Nepali (Devanagari) script.

NEPAL 2260 Intermediate Intensive Nepali @

Summer only. 6 credits. *Satisfies Option 1.* Prerequisite: NEPAL 1160 or placement by Nepali instructors. Students must formally apply. S. Oja and B. Oja.

Intermediate instruction in spoken grammar and verbal comprehension skills, with special attention to developing technical vocabularies and other verbal skills appropriate to students' professional fields.

NEPAL 3360 Advanced Intensive Nepali

Summer only. 6 credits. *Satisfies Option 1.* Prerequisite: NEPAL 2260 or placement by Nepali instructors. Students must formally apply. S. Oja and B. Oja.

Reading of advanced texts, together with advanced drills on the spoken language.

Pali**PALI 4450 Readings in Pali @**

Fall and spring. 3 credits. Prerequisite: permission of instructor. Letter grades only. A. Blackburn.

Readings in Pali selected in relation to student and instructor interests. This course may be repeated for credit with different topics and readings.

Sanskrit**SANSK 1131-1132 Elementary Sanskrit I and II (also CLASS 1331-1332, LING 1131-1132)**

1131, fall; 1132, spring. 4 credits each semester. Letter grades only. A. Nussbaum and A. Ruppel.

An introduction to the essentials of Sanskrit grammar. Designed to enable the student to read classical and epic Sanskrit as quickly as possible.

SANSK 2251-2252 Intermediate Sanskrit I and II (also CLASS 2351-2352, LING 2251-2252) @ #

2251, fall; 2252, spring. 3 credits each semester. *SANSK 2251 satisfies Option 1.* Prerequisite: at least one year study of Sanskrit or equivalent. Offered alternate years. Letter grades only. A. Ruppel and L. McCrea.

Review of grammar and reading of selections from Sanskrit epic poetry and narrative prose.

[SANSK 3323 Buddhist Sanskrit

Fall. 4 credits. Next offered 2011-2012. D. Boucher.]

SANSK 4431-4432 Directed Study

4431, fall; 4432, spring. 1-4 credits, variable. Prerequisite: permission of instructor. Letter grades only. Staff.

Intended for advanced language study.

Literature in Sanskrit**SNLIT 3301-3302 Advanced Sanskrit I and II (also CLASS 3393-3394) @ (LA-AS)**

3301, fall; 3302, spring. 4 credits each semester. Prerequisite: two years study of Sanskrit or equivalent. L. McCrea.

Selected readings in Sanskrit literary and philosophical texts.

SNLIT 4465 The Literature of Ancient India

Spring. 4 credits. L. McCrea.

The course will survey in translation a selection of major works of poetry, drama, and aesthetic theory and criticism from the Sanskrit literary tradition of ancient India. (LL)

Sinhala (Sinhalese)**SINHA 1121-1122 Elementary Sinhala**

1121, fall; 1122, spring. 4 credits each semester. Prerequisite: for SINHA 1122, SINHA 1121 or equivalent. Letter grades only. B. Herath.

Semi-intensive introduction to colloquial Sinhala, intended for beginners. A thorough grounding is given in all the language skills; listening, speaking, reading, and writing.

SINHA 2201-2202 Intermediate Sinhala @

2201, fall; 2202, spring. 3 credits each semester. *Satisfies Option 1.* Prerequisites: for SINHA 2201, SINHA 1102 or SINHA 1122; for SINHA 2202, 2201 or equivalent. Letter grades only. B. Herath.

This course further develops student competence in colloquial Sinhala, attending to all the language skills: listening, speaking, reading and writing. In addition, this course prepares students for the transition to literary Sinhala.

SINHA 3301 Literary Sinhala I @

Fall or spring. 3 credits. *Satisfies Option 1.* Prerequisite: SINHA 2201/2202 or permission of instructor. Letter grades only. B. Herath.

This one-semester course provides an introduction to the distinctive grammatical forms and vocabulary used in Literary Sinhala. While focused particularly on the development of reading skills, the course also introduces students to Literary Sinhala composition, and builds students' listening comprehension of semi-literary Sinhala forms (such as those used in radio and TV news).

SINHA 4400 Literary Sinhala II

Fall or spring. 2-4 credits variable. Prerequisite: SINHA 3301 or permission of instructor. B. Herath.

This one-semester course further develops students' comprehension of written Literary Sinhala, using sample materials from a variety of genres prepared by the instructor, as well as excerpts from texts relevant to graduate student research (when appropriate).

SINHA 4431-4432 Directed Study

4431, fall; 4432 spring. 1-4 credits variable. Prerequisite: permission of instructor. Letter grades only. B. Herath.

Intended for advanced language study.

Tagalog**TAG 1121-1122 Elementary Tagalog I and II**

1121, fall; 1122, spring. 4 credits each semester. Prerequisite: for TAG 1122, TAG 1121. Letter grades only. T. Savella.

Gives a thorough grounding in basic speaking and listening skills with an introduction to reading.

TAG 2205-2206 Intermediate Tagalog I and II @

2205, fall; 2206, spring. 3 credits each semester. *TAG 2205 satisfies Option 1.* Prerequisites: for TAG 2205, TAG 1122 or equivalent; for TAG 2206, 2205 or equivalent. Letter grades only. T. Savella. Develops all four skills: reading, writing, speaking, and comprehension.

TAG 3301-3302 Advanced Tagalog I and II @

3301, fall; 3302, spring. 3 credits each semester. *TAG 3301 satisfies Option 1.* Prerequisite: TAG 2206 or equivalent. Letter grades only. T. Savella. Continuing instruction on conversational skills but with emphasis on reading and writing. Selected core readings in contemporary Tagalog literature are used, but students, in consultation with the instructor, may select some of the reading materials.

TAG 4431-4432 Directed Study

4431, fall; 4432, spring. 1-4 credits, variable. Prerequisite: permission of instructor. Letter grades only. T. Savella. Intended for advanced language study.

Tamil**TAMIL 1121-1122 Elementary Tamil I and II**

1121, fall; 1122, spring. 4 credits. Prerequisite: for TAMIL 1122, TAMIL 1121 or permission of instructor. Letter grades only. S. Chavan.

This course will teach modern spoken and written Tamil to beginning level students. Students will learn Tamil through simple conversations, sentence and question construction, grammar, culture and festivals and folk tales of Tamilians of India, and how to express performance of simple daily activities. All course activities conducted in Tamil. An interactive videoconference course.

TAMIL 2201-2202 Intermediate Tamil I and II

2201, fall; 2202, spring. 4 credits. *TAMIL 2201 satisfies option 1.* Prerequisite: for TAMIL 2201, TAMIL 1121/1122 or permission of instructor; for TAMIL 2202, TAMIL 2201 or permission of instructor. S. Chavan.

To teach modern spoken and written Tamil to intermediate-level students. This course helps to acquire Tamil language proficiency, which refines and expands previously acquired linguistic skills in culturally authentic contexts. This course further incorporates reading, discussing, and analyzing texts as a basis for the expression and interpretation of meaning. All course activities are conducted in Tamil. Video-conference with Syracuse University.

Thai**THAI 1101-1102 Elementary Thai**

1101, fall; 1102, spring. 6 credits each semester. Prerequisite: for THAI 1102, THAI 1101 or equivalent. Intended for beginners or students placed by examination. Letter grades only. N. Jagacinski.

Gives a thorough grounding in all the language skills: listening, speaking, reading, and writing.

THAI 2201-2202 Intermediate Thai Reading @

2201, fall; 2202, spring. 3 credits each semester. *THAI 2201 satisfies Option 1.* Prerequisites: for THAI 2201, THAI 1102; for THAI 2202, 2201 or equivalent. Letter grades only. N. Jagacinski. Continuing instruction in spoken and written Thai.

THAI 2203-2204 Intermediate Composition and Conversation @

2203, fall; 2204, spring. 3 credits each semester. *THAI 2203 satisfies Option 1.* Prerequisites: for THAI 2203, THAI 1102; for THAI 2204, 2203. Letter grades only. N. Jagacinski. Intermediate instruction in spoken and written grammar and reading comprehension.

THAI 3301-3302 Advanced Thai @

3301, fall; 3302, spring. 4 credits each semester. *THAI 3301 satisfies Option 1.* Prerequisite: THAI 2202 or equivalent. Letter grades only. N. Jagacinski. Selected readings in Thai writings in various fields.

THAI 3303-3304 Thai Literature @

3303, fall; 3304, spring. 4 credits each semester. *THAI 3303 satisfies Option 1.* Prerequisite: THAI 3302 or equivalent. Letter grades only. N. Jagacinski. Reading of significant novels, short stories, and poetry written since 1850.

THAI 4431-4432 Directed Study

4431, fall; 4432, spring. 1-4 credits variable. Prerequisite: permission of instructor. Letter grades only. N. Jagacinski. Intended for advanced language study.

Urdu**URDU 1125 Introduction to the Urdu Script (also NES 1312)**

Fall or spring. 1 credit. Prerequisite: HINDI 1101 or permission of instructor. Letter grades only. S. Singh.

Focus of this course is to learn basic Urdu script. The course will meet two times per week, for one hour each. Students will learn how to read and write basic Urdu. In addition to teaching the script, the instructors will teach a significant number of most commonly used expressions and words in Urdu.

URDU 2201-2202 Intermediate Written Urdu I and II (also NES 2201-2202)

2201, fall; 2202, spring. 2 credits. Prerequisite: HINDI 1102 or HINDI 1110; and URDU 1125 or permission of instructor. Letter grades only. S. Singh.

This course is designed to develop competence in Urdu reading and writing for students with a first-year knowledge of Hindi and knowledge of Urdu script. May be taken concurrently with Intermediate Hindi.

URDU 4431-4432 Directed Study

4431, fall; 4432, spring. 1-4 credits variable. Prerequisite: permission of instructor. Letter grades only. S. Singh. Intended for advanced language study.

Vietnamese**VIET 1101-1102 Elementary Vietnamese I and II**

1101, fall; 1102, spring. 6 credits each semester. Prerequisite: for VIET 1102, VIET 1101 or equivalent. Intended for beginners or students placed by examination. Letter grades only. T. Tranviet. Gives a thorough grounding in all language skills: listening, speaking, reading, and writing.

VIET 2201-2202 Intermediate Vietnamese I and II @

2201, fall; 2202, spring. 3 credits each semester. *VIET 2201 satisfies Option 1.* Prerequisites: for VIET 2201, VIET 1102 or equivalent; for VIET 2202, 2201. Letter grades only. T. Tranviet. Continuing instruction in spoken and written Vietnamese.

VIET 2203-2204 Intermediate Vietnamese Composition and Reading I and II @

2203, fall; 2204, spring. 3 credits each semester. *VIET 2203 satisfies Option 1.* Prerequisite: placement by instructor. Letter grades only. T. Tranviet. Designed for students and "native" speakers of Vietnamese whose speaking and listening skills are at the advanced level, but who still need to improve writing and reading skills.

VIET 3301-3302 Advanced Vietnamese I and II @

3301, fall or spring; 3302, fall or spring. 3 credits each semester. *VIET 3301 satisfies Option 1.* Prerequisites: for VIET 3301, VIET 2202 or permission of instructor; for VIET 3302, 3301. Letter grades only. T. Tranviet.

Continuing instruction in spoken and written Vietnamese; emphasis on enlarging vocabulary, increasing reading speed, and reading various genres and styles of prose.

VIET 4431-4432 Directed Study

4431, fall; 4432, spring. 1-4 credits, variable. Prerequisite: permission of instructor. Letter grades only. T. Tranviet. Intended for advanced language study.

Literature in Vietnamese**[VTLIT 2222 Introduction to Classical Vietnamese @ #**

Spring. 3 credits. *Satisfies Option 1.* Prerequisite: qualification in Vietnamese or permission of instructor. Next offered 2010-2011. K. Taylor.

Introduces students to Han (classical Chinese as used in the Vietnamese language) and Nom (vernacular Vietnamese character writing). Students learn to read Han and Nom texts, from the 17th through 19th centuries, including historical records, prose writings, and poetry. (LL)

Related Courses in Other Departments and Colleges

Check the primary department section for the offering status of the following courses. Courses in other colleges will count as College of Arts and Sciences credit only for Asian Studies majors. Courses below generally count toward the Asian Studies major, as long as the course content is 50 percent or more focused on Asia. Such courses typically fall under the heading of Society and Culture (SC).

Asia/General Courses

- [ARTH 2800 Introduction to Art History: Approaches to Asian Art (SC)]
- DSOC 2050 International Development (SC)
- ECON 4730 Economics of Export-Led Development (SC)
- ILRIC 6370 Labor Relations in Asia (SC)
- ECON 4450 Industrial Policy (SC)
- ECON 4540 China and India: Growth Miracle (SC)

China—Area Courses

- [ANTHR 3535 The Situation of China's Minorities (SC)]
- ANTHR 7550 East Asia: Readings in Specific Problems (SC)
- CAPS/GOVT 2827 China and the World (SC)
- [ARTH 3800 Introduction to the Arts of China (SC)]
- [ARTH 4810 The Arts in Modern China (SC)]
- ECON 4690 China's Economy Under Mao and Deng (also CAPS 4690) (SC)

Japan—Area Courses

- ANTHR 2560 Japanese Society through Film (SC)
- ANTHR 7550 East Asia: Readings in Specific Problems (SC)
- ARCH 3309 Elements, Principles, and Theories in Japanese Architecture (SC)
- [HIST 2300 Japan and the Pacific War (SC)]

South Asia—Area Courses

- ANTHR 3421/6421 Sex and Gender (SC)
- ANTHR 3545 Peoples and Cultures of the Himalayas (SC)
- ANTHR 4406 Culture of Lives (SC)
- [ANTHR 6373 Human Evolution: History, Concepts, and Theory (also BIOES 6373) (SC)]
- ANTHR 7530 South Asia: Readings in Specific Problems (SC)
- ARCH 3402 Architecture as a Cultural System (SC)
- ARCH 4405 Architecture and the Mythic Imagination (SC)
- ARCH 4407 Architectural Design and the Utopian Tradition (SC)
- ARCH 4408 Topics in Architecture, Culture, and Society (SC)
- ARCH 4408–4418 Special Topics in Architectural Culture and Society (SC)
- ARCH 6401–6402 Architecture in Its Cultural Context I and II (SC)
- ARCH 6409 Graduate Investigations in Architecture, Culture, and Society (SC)
- CRP 6710 Seminar in International Planning (SC)

- [ECON 4750 The Economy of India (SC)]
- HD 6330 Language Acquisition (SC)

Southeast Asia—Area Courses

- [ANTHR 3516 Power, Society, and Culture in Southeast Asia (SC)]
- ANTHR 4420 Development of Anthropology Thought (SC)
- ANTHR 4523 Making History on the Margins: The China–SE Asian Borderlands (SC)
- ANTHR 7520 Southeast Asia: Readings in Special Problems (SC)
- ARTH 3960 The Arts of Southeast Asia (SC)
- ARTH 4900 Art and Collecting: East and West (SC)
- ARTH 4855 Threads of Consequence—Textiles in South and Southeast Asia (SC)
- GOVT 6423 Comparative Political Economy: East and Southeast Asia (SC)
- HIST 2440 The United States in Viet Nam (SC)
- HIST 3950 Southeast Asian History from the 18th Century (SC)
- HIST 6950 Early Southeast Asia: Graduate Proseminar (SC)
- HIST 6960 Modern Southeast Asia: Graduate Proseminar (SC)
- MUSIC 1341 Gamelan in Indonesian History and Cultures (SC)
- [MUSIC 3610 Cornell Gamelan Ensemble (SC)]
- [MUSIC 6301 Ethnomusicology (SC)]

ASIAN AMERICAN STUDIES PROGRAM

The Asian American Studies Program is a university-wide academic program housed administratively within the College of Arts and Sciences. Its aim is to promote teaching, research, and educational activities related to Asians in the Americas and to serve as a resource to the campus and regional communities. The program's undergraduate courses, offered within the program and cross-listed with departments in various colleges, meet distribution requirements and count toward a minor in Asian American Studies. The program does not offer a graduate course of study, but students can undertake graduate work in Asian American Studies within selected disciplines of the university.

Undergraduate Minor

The program's undergraduate minor affords students an opportunity to develop a multidisciplinary approach to the study of Asians in the hemispheric Americas. The course of study stresses developments not only within the United States, but also underscores the transnational and comparative contexts of Asian America and the field's connections with African American, American Indian, Latino, and Women's Studies. Students must work with a faculty advisor from among the program's affiliated faculty and must

complete at least 15 units of credits as follows: (1) AAS 1100 and two additional courses in Asian American Studies; (2) one course in African American, American Indian, U.S. Latino Studies, or Feminist, Gender, & Sexuality Studies*; and (3) one course in East Asian, South Asian, or Southeast Asian Studies.* (*These courses must be approved by the student's faculty advisor, and they should address issues of race, gender, or the histories and cultures of Asian peoples.) Students must file an application for the minor with the Asian American Studies Program.

Resource Center

The program's Asian American Studies Resource Center, located in 420 Rockefeller Hall, provides meeting space for the more than 50 undergraduate student organizations of the Cornell Asian Pacific Student Union and the Society for Asian American Graduate Affairs. It also holds a modest print collection of books, periodicals, and newspapers; a current news clipping file; a comprehensive database of publications on Asian Americans since 1977; and a sizable collection of videotapes as well as music CDs on the Asian American experience.

Research

The program encourages faculty and student research on Asian Americans by sponsoring guest lectures, conferences, film festivals, readings, and exhibits. It also funds research projects and student travel to conferences and research sites. The Asian American Studies Workshop is the program's principal research initiative, engaging Cornell's faculty and students with invited faculty from other universities in a yearlong intensive study of selected themes.

Core Faculty

D. Chang, C. Lai, V. Munasinghe, S. Wong

Courses**AAS 1100 Introduction to Asian American Studies (CA-AS)**

Spring. 3 credits. Can be used to satisfy either social science or humanities distribution requirement. S. Wong. The purpose of this course is fourfold: (1) to introduce students to the multifaceted experiences of Asians in the United States; (2) to examine how a diverse group of people came to be identified as "Asian Americans"; (3) to understand the role of difference—gender, class, ethnic—in the formation of "Asian American" identities; and (4) to link historical experiences with contemporary issues.

AAS 2130 Introduction to Asian American History (also AMST/HIST 2640) (HA-AS)

Fall. 4 credits. D. Chang.
For description, see HIST 2640.

AAS 2620 Asian American Literature (also AMST/ENGL 2620) (LA-AS)

Spring. 4 credits. S. Wong.
For description, see ENGL 2620.

[AAS 3030 Asians in the Americas: A Comparative Perspective (also ANTHR 3703) (CA-AS)]

Fall. 4 credits. Next offered 2010–2011.
V. Munasinghe.]

AAS 3470 Asian American Women's History (also AMST/FGSS/HIST 3470) (CA-AS)

Spring. 4 credits. D. Chang.
For description, see HIST 3470.

AAS 3801/6801 Asian American Urban Experience (also AMST/CRP 3801/6801)

Fall. 3 credits. C. Lai.
The seminar examines the histories and geographies of urban Asian American communities. We begin with an introduction to key geographical terms and spatial theories and then use them to analyze different Asian ethnic communities throughout North America. This includes an investigation of 19th- and early-20th-century segregated ethnic enclaves on the West Coast and the East Coast as well as an examination of postwar Asian American communities in suburbs.

AAS 3901 Asian American Politics and Public Policy (also AMST/CRP 3102/6102) (CA-AS)

Spring. 3 credits. C. Lai.
This lecture course examines key political and public policy issues affecting Asian American communities, such as immigration law, racial profiling, labor struggles, and electoral politics. We pay particular attention to political mobilization efforts of different Asian ethnic groups and examine how these groups have organized, framed their issues, and mobilized in terms of space, place, and spatial scale.

AAS 3950 Race, Space, and Place (also AMST 3950/6950, CRP 3101/6101) (CA-AS)

Fall. 3 credits. C. Lai.
This seminar examines critical theories of race and space and investigates key sites where racial formation and spatial production intersect. These multiscale sites include the neoliberal city, the prison industrial complex, and the Mississippi Delta. We analyze not only the fatal coupling of difference, power, and space, but also the spatial politics of resistance and refusal.

[AAS 4310 Mind, Self, and Emotion (also HD 4310) (SBA-AS)]

3 credits. Next offered 2010-2011.
Q. Wang.
For description, see HD 4310.]

[AAS 4240 Asian American Communities (also AMST/HIST 4200) (HA-AS)]

Fall. 4 credits. Next offered 2010-2011.
D. Chang.]

AAS 4520 Culture and Human Development (also COGST/HD 4520) (CA-AS)

Spring. 3 credits. Q. Wang.
For description see HD 4520.

AAS 4530 20th-Century American Women Writers of Color (also AMST/ENGL/FGSS 4530) (LA-AS)

Fall. 4 credits. S. Wong.
For description, see ENGL 4530.

[AAS 4790 Ethnicity and Identity Politics: An Anthropological Perspective (also ANTHR 4749) (SBA-AS)]

Next offered 2010-2011. V. Munasinghe.
For description, see ANTHR 4749.]

AAS 4950 Independent Study

Fall or spring. 1-4 credits. Topic and credit hours TBA arranged between faculty and student. Independent study forms must be approved by Asian American Studies Program office. Staff.

[AAS 4970 Jim Crow and Exclusion-Era America (also AMST/HIST 4970/6970)]

Spring. 4 credits. Next offered 2011-2012.
D. Chang.]

ASTRONOMY

I. M. Wasserman, chair (616 Space Sciences Bldg., 254-4556); G. J. Stacey, director of undergraduate studies (212 Space Sciences Bldg., 255-5900); R. E. Bean, J. F. Bell, J. A. Burns, D. B. Campbell, D. F. Chernoff, J. M. Cordes, E. E. Flanagan, P. J. Gierasch, R. Giovanelli, M. P. Haynes, T. L. Herter, J. R. Houck, D. Lai, J. P. Lloyd, R. V. E. Lovelace, P. D. Nicholson, S. W. Squyres, Y. Terzian, S. A. Teukolsky, J. F. Veverka. Emeritus: P. F. Goldsmith, M. O. Harwit

Cornell's Astronomy faculty, research staff, graduate, and undergraduate students are active in diverse areas of modern astronomy ranging from theoretical astrophysics and general relativity to radio and radar astronomy, submillimeter, infrared and optical astronomy, and the exploration of the solar system. Cornell operates two local optical observatories, the world's largest radio telescope at Arecibo, Puerto Rico, and with two other institutions, the 200-inch optical telescope at Mt. Palomar in California. With Caltech, Cornell is carrying out a design study for a large submillimeter telescope in the high Atacama desert in Chile. Several members of the department faculty are also principal investigators on major NASA space and planetary exploration missions.

The department offers a number of courses to satisfy a general interest in astronomy. These courses have few or no prerequisites and are not intended for the training of professional astronomers. Among the introductory courses, several choices are available, depending on background and on the requirements to be fulfilled. The 1000-level courses are designed primarily for nonscience majors. The alternative introductory sequence ASTRO 2211-2212 is geared toward sophomore physical science and engineering majors and requires co-registration in beginning calculus. ASTRO 2201 and 2202 are intended for students with an interest in astronomy but no scientific background; they are topical rather than survey-oriented. ASTRO 3332 is designed for physical science and engineering majors as an introduction to astrophysics. Other courses at the 2000 and 3000 levels may appeal to students of various backgrounds and interests, as indicated in the individual course descriptions.

Courses numbered above 4000 are intended for students who have had two to three years of college physics and at least two years of college mathematics. ASTRO 4940 Independent Study permits students to engage in individual research projects under the guidance of a faculty member.

Interested students are encouraged to become members of the undergraduate Cornell Astronomy Club. The club has access to the Fuertes Observatory on campus and conducts regular observing and astrophotography sessions. All students are invited to visit the Space Sciences Building, see the exhibits on display there, and consult faculty members about career plans or choice of courses.

The Major

The purpose of the major in Astronomy is to provide in-depth knowledge and education about the nature of the universe. Astronomy relies heavily on preparation in physics and mathematics. Consequently, many courses in these fields are included as prerequisites. In preparation for the major, students normally elect the introductory physics sequence PHYS 1112-2213-2214 or 1116-2217-2218 and the complementary pathway in mathematics, MATH 1110-1220-2210-2220 or 1910-1920-2930-2940 (or equivalent). Students who anticipate undertaking graduate study are urged to elect the honors physics sequence PHYS 1116-2217-2218-3318-3327 if possible. We recommend, but do not require, that prospective astronomy majors take at least one of the following courses: ASTRO 2211, ASTRO 2212, ASTRO 2233, ASTRO 2290. Students are also urged to acquire computer literacy. ASTRO 3334 is designed to give students hands-on experience with the methods of analysis, visualization, and simulation needed in astrophysical research. Acceptance to the major is first considered after completion of three semesters of introductory physics and mathematics and in general requires a GPA of 3.2 in physics and mathematics courses.

The major requirements stress the importance of building a strong preparation in physical science. The following upper-level courses are normally required:

PHYS 3314 or 3318, 3316, 3323 or 3327, 3341 and 4443

AEP 3210-3220 (or equivalent, e.g., MATH 4200 and 4220)

ASTRO 4410, 4431, and 4432

With permission of the major advisor, students interested in planetary studies may substitute appropriate advanced courses or may pursue an independent major under the program in the Science of Earth Systems. Majors are encouraged to supplement the above courses with any astronomy, physics, or other appropriate courses at or above the 3000 level. Advanced seniors can enroll in astronomy graduate courses with the permission of the instructor. Students are also encouraged to work with faculty members on independent study projects under the course ASTRO 4940 or to apply to a variety of programs at Cornell, Arecibo, and elsewhere that offer undergraduates summer employment as research assistants. Nearly all undergraduate majors and concentrators become involved in research projects in the junior and senior years.

Students whose interest in astronomy is sparked somewhat late in their undergraduate career are encouraged to discuss possible paths with the director of undergraduate studies in Astronomy.

Honors. A student may be granted honors in Astronomy upon the recommendation of the Astronomy Advisors Committee of the Astronomy faculty. Typical requirements for graduating with honors are a minimum GPA of 3.5 over the past four semesters and grades of A- or better in ASTRO 4410, 4431, and 4432.

Double majors. A double major in Astronomy and another subject is possible in many circumstances. However, the set of courses used to fulfill the requirements for each major must be completely independent.

Minor. The minor in Astronomy for other majors normally requires 12 credits, at least 8 of which must be at the 3000 level or above. We recommend, but do not require, that sophomores planning to concentrate in Astronomy take at least one of the following courses: ASTRO 2211, ASTRO 2212, ASTRO 2233, ASTRO 2290.

Distribution Requirement

All courses in astronomy, except ASTRO 1109, may be used to fulfill the science distribution requirement in the College of Arts and Sciences.

Courses

ASTRO 1101 The Nature of the Universe (PBS)

Fall. 3 credits. Limited to 30 students per disc sec. *Students may not receive credit for both ASTRO 1101 and 1103.* J. Lloyd. Introduces students to the cosmos. The birth, evolution, and death of stars, the formation of the chemical elements, and the nature of white dwarfs, neutron stars, and black holes are discussed. An introduction to the theories of special relativity and general relativity is given. The course covers the search for other worlds outside the solar system and the possible existence of life and intelligence elsewhere in the universe. Modern theories of cosmology are presented, and the origin, structure, and fate of the universe are discussed. Most of the course notes as well as sample exams and simulations are made available on the web.

ASTRO 1102 Our Solar System (PBS)

Spring. 3 credits. Limited to 30 students per disc sec. *Students may not receive credit for both ASTRO 1102 and 1104.* S. Squyres and J. Veverka.

The past few decades have seen incredible advances in the exploration of our solar system. In this course students learn about the current state and past evolution of the Sun and its family of planets, moons, asteroids, and comets. The course emphasizes images and other data obtained from current and past NASA space missions and how these data provide insights about the important processes that have shaped the evolution of solar system objects. General astronomical concepts relevant to the study of the solar system are also discussed. Critical focus is on developing an understanding of the Earth as a planetary body and discovering how studies of other planets and satellites influence models of the climatic, geologic, and biologic history of our home world. Other topics covered include energy production in stars, global warming, impact hazards, the search for life in the solar system and beyond, and future missions.

ASTRO 1103 The Nature of the Universe (PBS)

Fall. 4 credits. Limited to 22 students per lab, 30 students per disc sec. *Students may not receive credit for both ASTRO 1101 and 1103.* J. Lloyd. Identical to ASTRO 1101 except for addition of the laboratory.

ASTRO 1104 Our Solar System (PBS)

Spring. 4 credits. Limited to 22 students per lab, 30 students per disc sec. *Students may not receive credit for both ASTRO 1102 and 1104.* S. Squyres and J. Veverka. Identical to ASTRO 1102 except for addition of the laboratory.

ASTRO 1105 An Introduction to the Universe (PBS)

Summer. 3 credits. Recommended: high school physics. *Students may not receive credit for both ASTRO 1105 and 1107.* D. Kornreich.

How do we measure the size of our galaxy and the size of the universe? Is the universe round or flat? How are the stars born, why do they shine, and how do they die? What are the chemical elements, and how were they formed in stars? What are quasars, pulsars, and black holes? How was the solar system formed? What are the environments of other planets like? What is the basic structure of Earth and the other planets? Will we catastrophically alter the earth? Does life exist elsewhere in the universe? How can we find out? Each student has an opportunity to make observations with small telescopes.

ASTRO 1106 Essential Ideas in Relativity and Cosmology (PBS)

Summer. 3 credits. Prerequisites: high school algebra and trigonometry. A. Brazier.

Explanation of Einstein's theories of special and general relativity, which brought about a fundamental change in our conceptual understanding of space and time. Correspondence to, and conflicts with, common sense. Applications to various areas in special relativity (space travel, the equivalence of mass and energy, nuclear fission and fusion, and thermonuclear processes in the sun) and in general relativity (motion of light and particles in curved space-time, cosmological models, and the question of whether the universe is open or closed).

ASTRO 1107 An Introduction to the Universe (PBS)

Summer. 4 credits. *Students may not receive credit for both ASTRO 1105 and 1107.* D. Kornreich.

Identical to ASTRO 1105 except for the addition of the afternoon laboratory that emphasizes mathematical problem-solving. This option is recommended for potential majors in science and engineering.

ASTRO 1195 Observational Astronomy (PBS)

Fall. 3 credits. Limited to 24 students. G. Stacey.

Provides a "hands-on" introduction to observational astronomy intended for liberal arts students at the freshman and sophomore level. High school mathematics is assumed, but otherwise there are no formal prerequisites. The course objective is to teach how we know what we know about the universe. The course is set up with two lectures and one evening laboratory per week. Not all of the evening sessions are used. Planned exercises include five or six observational labs (star gazing with binoculars and small telescopes, telescopic observations and CCD imaging of star clusters, nebulae, and the planets, solar observations, radio observations of the Milky Way Galaxy), plus a selection of exercises from the following: experiments in navigating by the stars; construction and use of simple instruments such as optical spectrometers and sun dials; laboratory spectroscopy; experiments in planetary cratering; collection and study of micrometeorites; analyses of planetary and lunar images obtained by the class, measuring the diameter of Earth or the size of the solar system.

ASTRO 2201 Our Home in the Universe (PBS)

Fall. 3 credits. Prerequisite: freshman or sophomore standing. No scientific background assumed. R. Giovanelli and M. Haynes.

General discussion of our relation to the physical universe and how our view of the universe has changed from ancient to modern times. Several main themes are covered over the course of the semester: the evolution of our view of the sky from that of ancient cultures to that of space telescopes; the death of stars and the formation of black holes; dark matter and the structure of galaxies; and the origin, evolution, and fate of the universe. Presents a nonmathematical introduction to these subjects and discuss uncertainties and unresolved issues in our understanding.

ASTRO 2202 Our Home in the Solar System (PBS)

Spring. 3 credits. Prerequisite: freshman or sophomore standing; some background in science. J. Veverka.

Writing course designed to develop an understanding of our home planet as a member of a diverse family of objects in our solar system. Discussion centers on how studies of other planets and satellites have broadened our knowledge and perspective of Earth, and vice versa. We study, debate, and learn to write critically about important issues in science and public policy that benefit from this perspective. Topics discussed include global warming, the impact threat, the searches for extrasolar planets and extraterrestrial intelligence, and the exploration of Mars.

ASTRO 2211 Astronomy: Stars, Galaxies, and Cosmology (PBS)

Fall. 4 credits. Intended for first- and second-year engineering and physical sciences students. Prerequisite: introductory calculus or co-registration in MATH 1110 or 1910 or permission of instructor. R. Bean.

This course offers an introduction to astrophysics aimed at prospective science and engineering majors. It covers a broad array of topics in astrophysics including the formation, structure, evolution and observational properties of normal and extreme stars, galaxies and cosmology, and the underlying physical processes governing them. The textbook is by Kutner. This course is a slightly more mathematical and physics-oriented alternative to ASTRO 1101/1103.

ASTRO 2212 The Solar System: Planets, Satellites, and Rings (PBS)

Spring. 4 credits. Intended for first- and second-year engineering and physical sciences students. Prerequisite: introductory calculus or co-registration in MATH 1110 or 1910; some knowledge of classical physics (mechanics and thermodynamics). D. Campbell and P. Gierasch.

Introduction to the solar system with emphasis on the quantitative application of simple physical principles to the understanding of what we observe or can deduce. Topics include the Sun and the interior processes that control its luminosity, the interiors, surfaces, and atmospheres of the planets including the effects of greenhouse gases, satellites, and small bodies, orbits of solar system bodies and the search for extra-solar planets. Results from past and current spacecraft missions will be

discussed including the Cassini mission to the Saturn system and the Mars Exploration Rovers.

[ASTRO 2233 Topics in Astronomy and Astrophysics]

Fall. 3 credits. Intended for sophomores planning to major in Astronomy or related fields. Prerequisites: co-registration in PHYS 1112 or 1116, MATH 1120, 1220 or 1920. Home page: www.astro.cornell.edu/academics/courses/astro233. Next offered 2010–2011. M. Haynes and D. Campbell.]

ASTRO 2280 Space Exploration (PBS)

Fall. 3 credits. No special background in physical sciences, math, or engineering assumed. S. Squyres.

Provides an overview of space science, with particular emphasis on the solar system, and a detailed examination of a few selected objects, including the planet Mars, the satellites in the outer solar system, and comets. The focus is on methods of collecting information and especially on spacecraft and space missions. Topics include the design and limitations of instruments. Ethical and political questions associated with space exploration are discussed. Intended for students with an interest in science, technology, and associated policy issues.

ASTRO 2290 Relativity and Astrophysics (PBS)

Spring. 4 credits. Prerequisites: freshman physics, calculus, and geometry. T. Herter. Provides a geometrically based introduction to special and general relativity, followed by consideration of astrophysical applications. Includes discussion of tests of Einstein's theory of space, time, and gravitation; the physics of white dwarfs, neutron stars, and black holes; an introduction to modern cosmology.

ASTRO 2299 Search for Life in the Universe (PBS)

Spring. 4 credits. Prerequisites: two courses in any physical science subject or permission of instructors. J. Cordes and Y. Terzian.

Surveys the contents of the universe. Reviews theories of cosmic and stellar evolution, and of the formation and evolution of planetary systems, planetary atmospheres, and surfaces. Questions regarding the evolution of life and the development of technology are discussed. Methods to detect extraterrestrial life with emphasis on radio telescopes and associated instrumentation are presented. Hypothetical communication systems are developed and discussed.

ASTRO 3310 Planetary Imaging Processing (PBS)

Fall. 3 credits. Intended for sophomores or juniors majoring or concentrating in Astronomy or related fields. Prerequisites: two semesters of introductory physics and some experience with computer programming; permission of instructor required (form available in S8610). J. Bell. Reviews basic techniques employed in the collection and processing of spacecraft images of solar system objects. See www.astro.cornell.edu/courses/astro310/main.html for course details.

ASTRO 3332 Elements of Astrophysics (PBS)

Spring. 4 credits. Prerequisites: MATH 1120, 1220, 1920, or equivalent; PHYS 2213 or 2217. J. Houck.

Introduction to astronomy, with emphasis on the application of physics to the study of the universe. Covers: physical laws of radiation; distance, size, mass, and age of stars, galaxies, and the universe; stellar evolution and nucleosynthesis; supernovae and black holes; galaxies and quasars. Introduction to cosmology. Mainly intended for students of science, engineering, and science education interested in astronomy and astrophysics.

ASTRO 3334 Modern Astrophysical Techniques (PBS)

Spring. 3 credits. Intended for sophomores majoring or concentrating in Astronomy or related fields. Prerequisites: two semesters of introductory physics and two semesters of calculus. Recommended: ASTRO 2233. J. Lloyd.

The course reviews the basic techniques employed in astrophysical research, both observational and theoretical, to explore the universe. Basic methods and strategies of data acquisition and image and signal processing are discussed. Students gain hands-on experience with visualization techniques and methods of error analysis, data fitting, and numerical simulation. Exercises address the processes by which astrophysicists piece together observations made with today's foremost astronomical instruments to solve questions concerning the origin of planets, stars, galaxies, and the universe itself.

ASTRO 4410 Experimental Astronomy (PBS)

Fall. 4 credits. Prerequisites: PHYS 2214/2218 (or 3310 or 3360), PHYS 3323/3327 (or co-registration). J. Cordes and J. Houck.

Observational astrophysics. Major experiments involve techniques in CCD (charge-coupled-device) imaging, optical photometry, optical spectroscopy, radiometry, radio spectroscopy and radio astronomy. The experiments involve use of the Hartung-Boothroyd Observatory's 24-inch telescope, a laboratory two-element radio interferometer, and a radio telescope mounted on top of the Space Sciences Building. The laboratory covers the fundamentals of using astronomical instrumentation and data analysis as applied to celestial phenomena: asteroids, normal stars, supernova remnants, globular clusters, planetary nebulae, the interstellar medium, OH masers, and galaxies.

ASTRO 4431 Introduction to Astrophysics and Space Sciences (PBS)

Fall. 4 credits. Prerequisites: mathematics above 2000 level and physics above 3000 level. Recommended: PHYS 4443. D. Chernoff and P. Nicholson.

Overview of modern astrophysical concepts for physical science majors. Major topics include stellar formation, structure, and evolution; stellar atmospheres; compact objects (white dwarf, neutron star, and black holes); planets; and brown dwarfs. Current research problems in these areas are introduced along the way. The emphasis is on using fundamental principles of physics to explain astronomical phenomena. A variety of physics, including elements of atomic and molecular physics, solid state physics and fluid mechanics, are introduced or reviewed in a quick, practical fashion to be put to use in solving astrophysics puzzles.

ASTRO 4432 Introduction to Astrophysics and Space Sciences II (PBS)

Spring. 4 credits. Prerequisite: ASTRO 4431 or permission of instructor. T. Herter and G. Stacey.

Covers two broad topics: the astrophysics of the interstellar medium and cosmology. The interstellar medium section covers thermal equilibrium and radiative transport in HII regions, atomic gas regions, and molecular clouds. The cosmology section includes expansion of the universe, metrics, Friedmann equations, dark matter, cosmological tests, the early universe, and the cosmological production of the elements.

ASTRO 4445 Introduction to General Relativity (also PHYS 4445) (PBS)

Fall. 4 credits. Staff.

For description, see PHYS 4445.

ASTRO 4490 Senior Seminar Critical Thinking (PBS)

Fall. 4 credits. Prerequisites: none. Open to all students. Y. Terzian.

Critical thinking in scientific and nonscientific contexts with selections from the history of astronomy. Topics include elements of classical logic, including standards of evidence. Case studies include examples of competing hypotheses in the history of science, as well as examples from borderline sciences. Stress is put on creative generation of alternative hypotheses and their winnowing by critical scrutiny. Topics include the nature and history of the universe, the nature of time, the nature of reality, the possibilities of life on other planets, and artificial intelligence. Fallacies, illusions, and paradoxes will also be discussed. The course includes debates by the students on controversial topics such as: Can machines think? Is science and technology to be blamed for Hiroshima and 9/11? Should the genome be improved? Is the future determined?

ASTRO 4940 Independent Study in Astronomy

Fall or spring. 2–4 credits. Prerequisite: permission of instructor; to register: obtain an independent study form in department office, 610 Space Sciences Bldg.

Recommended: familiarity with topics covered in ASTRO 3332, 4431, or 4434.

Individuals work on selected topics. A program of study is devised by the student and instructor.

[ASTRO 6509 General Relativity I (also PHYS 6553)]

Fall. 4 credits. Prerequisite: knowledge of special relativity and methods of dynamics at level of *Classical Mechanics* by Goldstein. Next offered 2010–2011.

E. Flanagan.

For description, see PHYS 6553.]

[ASTRO 6510 General Relativity II (also PHYS 6554)]

Spring. 4 credits. Prerequisite: ASTRO 6509. Next offered 2010–2011. E. Flanagan.

For description, see PHYS 6554.]

ASTRO 6511 Physics of Black Holes, White Dwarfs, and Neutron Stars (also PHYS 6525)

Fall. 4 credits. Prerequisites: all of physics at upper-division undergraduate level. D. Lai.

Compact objects (neutron stars, black holes, and white dwarfs) are the endpoints of stellar evolution. They are responsible for some of

the most exotic phenomena in the universe, including supernova explosion, radio pulsars, bright X-ray binaries, magnetars, and gamma-ray bursts. Supermassive black holes also lie at the heart of the violent processes in active galactic nuclei and quasars. The study of compact objects allows one to probe physics under extreme conditions (high densities, strong magnetic fields, and gravity). This course surveys the astrophysics of compact stars and related subjects. Emphasis is on the application of diverse theoretical physics tools to various observations of compact stars. There are no astronomy or general relativity prerequisites. At the level of *Physics of Black Holes, White Dwarfs, and Neutron Stars* by Shapiro and Teukolsky.

ASTRO 6516 Galactic Structure and Stellar Dynamics

Fall. 4 credits. D. Chernoff.
Introduction to the study of the structure of galaxies via the laws of modern physics. Topics include the observed kinematics and spatial distribution of stars in the vicinity of the Sun, shapes and properties of stellar orbits, the gravitational N-body problem, collisional relaxation in stellar systems, spiral structure, galaxy classification and evolution, and cosmological results in galaxy formation.

ASTRO 6520 Radio Astronomy

Fall. 4 credits. J. Cordes and D. Campbell.
Covers radio astronomy telescopes and electronics; antenna theory; observing procedures and data analysis; concepts of interferometry and aperture synthesis.

[ASTRO 6523 Signal Modeling, Statistical Inference, and Data Mining in Astronomy]

Fall. 4 credits. Next offered 2010–2011. J. Cordes.]

[ASTRO 6525 Techniques of Optical/Infrared and Submillimeter Astronomy]

Fall. 4 credits. Next offered 2010–2011. T. Herter.

Optical design, detectors, cryogenic techniques, and data analysis are discussed and related to instrument design and use within the context of current astronomical research.]

ASTRO 6530 Astrophysical Processes

Spring. 4 credits. D. Lai, T. Herter, and G. Stacey.

Fundamentals of radiative transfer, bremsstrahlung, synchrotron radiation, Compton scattering, spectral line transfer, gas heating and cooling and topics in atomic and molecular spectroscopy topics are discussed within the framework of astrophysical sources and problems.

[ASTRO 6531 Astrophysical Fluid Dynamics]

Spring. 4 credits. Next offered 2010–2011. D. Lai.]

[ASTRO 6560 Theory of Stellar Structure and Evolution (also PHYS 7667)]

Fall. 4 credits. Next offered 2010–2011. D. Chernoff.]

ASTRO 6570 Physics of the Planets

Fall. 4 credits. P. Nicholson.

Introductory survey of planetary science with an emphasis on the application of physical principles. Planetary dynamics, including satellite orbits, tidal interactions, resonances, and ring dynamics. An introduction to the theory of planetary interiors, gravitational

fields, heat sources, and rotational mechanics. Intended for graduate students and seniors in astronomy, physics, and engineering.

[ASTRO 6571 Mechanics of the Solar System (also TAM 6730)]

Spring. 3 credits. Next offered 2010–2011. J. Burns.

For description, see TAM 6730.]

[ASTRO 6575 Planetary Atmospheres (also EAS 5750)]

Fall. 4 credits. Next offered 2010–2011. P. Gierasch.]

[ASTRO 6577 Planetary Surface Processes (also EAS 5770)]

Spring; 3 or 4 credits (3 credits for course only; 4 credits if registered for lab trip). Next offered 2010–2011. J. Bell.]

[ASTRO 6578 Planet Formation and Evolution (also EAS 5780)]

Fall. 4 credits. Next offered 2010–2011. M. Pritchard.]

[ASTRO 6579 Celestial Mechanics (also TAM 6720)]

Spring. 3 credits. Next offered 2010–2011. J. Burns.

For description, see TAM 6720.]

[ASTRO 6590 Galaxies and the Universe]

Fall. 4 credits. Next offered 2010–2011. R. Giovanelli and M. Haynes.

The universe, its large-scale structure and history; morphology, photometry, dynamics, kinematics and active nuclei of galaxies; galaxy formation and evolution; cosmological theory and observations.]

ASTRO 6599 Cosmology (also PHYS 6599)

Spring. 4 credits. Prerequisites: statistical physics, quantum mechanics, and electromagnetic theory courses. R. Bean.

Intended to provide a detailed theoretical development of current ideas in cosmology. Topics include Big Bang cosmology and universe's matter content; a cosmological chronology very early universe, symmetry breaking, inflationary scenarios, nucleosynthesis, recombination, growth of irregularities, galaxy formation and clustering, dark energy; current and future cosmological observational approaches.

ASTRO 6940 Advanced Study and Research

Fall or spring. Credit TBA.

Guided reading and seminars on topics not currently covered in regular courses.

ASTRO 7620 Seminar: Advanced Radio Astronomy

Spring. 2 credits. Prerequisites: for advanced undergraduates, by permission of instructor. Recommended: some background in astronomical spectroscopy. R. Giovanelli and M. Haynes.

The rich and homogeneous datasets acquired by recent legacy extragalactic surveys have enabled studies of the evolution across cosmic time of galaxies and their stellar populations, their star formation rates and interstellar media as well as the determination of observational constraints imposed on large-scale structure, dark matter, dark energy and fundamental constant evolution. This seminar will explore in detail the survey strategies and technical design of recent legacy-class extragalactic surveys, including ALFALFA, SDSS, 2MASS and key projects undertaken with HST, Spitzer, GALEX, the VLA and Herschel, as well as their

data products and the Virtual Observatory tools available to mine them. The optimization of strategies of future extragalactic surveys will be investigated including those planned using AO40 and CCAT.

[ASTRO 7621 Seminar: Planetary Radar Astronomy]

Spring. 3 credits. Prerequisites: upper-level undergraduates and graduate students in Astronomy, engineering, and geology; good background in undergraduate mathematics and physics. Next offered 2010–2011. D. Campbell and J.-L. Margot.

Discussion of radar techniques and the results from the application of these techniques to the study of solar system bodies including the Earth.]

ASTRO 7652 Advanced Atmospheric Dynamics (also EAS 6520)

Spring. 3 credits. S. Colucci.

For description, see EAS 6520.

ASTRO 7660 Cosmic Electrodynamics (also AEP 6080)

Spring. 2 credits. R. Lovelace.

Selected topics discussed in detail: the solar wind, stellar winds, Bondi accretion, Bondi-Hoyle accretion, accretion disks with B fields, magneto-rotational instability, magneto-centrifugal winds and jets from disks, Poynting jets, funnel flows, the propeller stage of accretion, advection and convection dominated accretion flows, fast dynamo processes in astrophysics.

ASTRO 7671 Seminar: Lunar Science and Exploration (also EAS 7310)

Fall. 3 credits. J. Bell and M. Pritchard.

This graduate seminar (open to motivated undergraduates) will explore scientific and engineering questions related to the myriad international human and robotic lunar missions. During the weekly meeting, the instructors and students will discuss classic and recent scientific papers on lunar composition, origin, environment, surface properties, impact cratering and other topics. Students taking the class for credit will also complete individual or group research projects including analysis of new datasets. The results of these projects will be presented orally and in written form. The class will be offered for 3 credits, and may be taken for a grade or S-U.

[ASTRO 7671 Seminar: Planetary Science—Composition and Mineralogy of the Martian Surface (also EAS 6930)]

Spring. 3 credits. Next offered 2010–2011. J. Bell.]

[ASTRO 7671 Seminar: Planetary Science—Micron to Millimeter Astronomy]

Spring. 3 credits. Next offered 2010–2011. J. Houck and G. Stacey.

Covers topics of current interest in infrared and submillimeter astrophysics.]

[ASTRO 7671 Seminar: The Nature and Exploration of Comets]

Fall. 3 credits. Next offered 2010–2011. J. Veverka.

The course will review the current understanding of comets. Particular attention will be given to results obtained by recent spacecraft missions.]

ASTRO 7673 Seminar: Planetary Atmospheres

Spring, 2 credits, P. Gierasch.

Usually taught every other year. Topics vary. In the past this course has focused on the planetary boundary layer, on convection, on comparative climate dynamics and on atmospheric waves and instabilities. Topics are often chosen to treat new data that is recently available from spacecraft missions.

ASTRO 7690 Seminar: Computational Physics (also PHYS 4480/7680)

Spring, 3 credits. Prerequisite: working knowledge of FORTRAN. Staff.

For description, see PHYS 4480/7680.

[ASTRO 7699 Seminar: Problems in Theoretical Astrophysics (also PHYS 7665)]

Fall, 2 credits. Next offered 2010-2011. D. Lai.

Topics in condensed matter, atomic, nuclear and particle astrophysics will be treated, with examples from domains ranging from planets to white dwarfs and neutron stars.]

BIOLOGICAL SCIENCES

The biological sciences ("biology") major is distinguished from other life sciences majors by its focus on basic, as opposed to applied, aspects of biology. All biology majors take courses in genetics, evolutionary biology, and biochemistry—subjects fundamental to understanding questions spanning the full spectrum of biology in the age of genomics.

In addition to taking these core courses, each student completes a Program of Study ("concentration") that affords the opportunity for acquiring a more detailed knowledge of particular subject areas: Animal Physiology, Biochemistry, Computational Biology, Ecology and Evolutionary Biology, Genetics and Development, Insect Biology, Molecular and Cell Biology, Microbiology, Neurobiology and Behavior, Nutrition, Plant Biology, and Systematics and Biotic Diversity. Alternatively, students may choose to explore three or more of these areas in the General Biology Program of Study.

The continuing rapid advances in biology are built on an ever-greater integration with the physical sciences and mathematics. Thus, the biology major is designed to provide students with a strong foundation not only in core areas of modern biology, but also in chemistry, organic chemistry, physics, and mathematics.

Students work with faculty, staff, and student advisors in selecting their Program of Study and in choosing the course options that each offers. The Office of Undergraduate Biology (OUB) in 216 Stimson Hall oversees advising for biology majors, and also coordinates the extensive undergraduate biology research program, including the biology research honors program, and the Biology Scholars Program.

The biology major is very popular among students of both the College of Agriculture and Life Sciences and the College of Arts and Sciences. It provides excellent preparation not only for various advanced degrees in science, but also for health careers, because so many of its requirements are also requirements for medical, dental, or veterinary programs. For more details about the biology major and

minor see the section in this catalog on biological sciences or visit www.biology.cornell.edu.

Courses with Overlapping Content

Because the department offers many courses with overlapping content, students must choose their courses carefully to ensure that they will receive credit for each course they take. Listed below are courses that have similar content. Students will receive credit for only one of the courses in each group.

BIOG 1101 & 1103, 1105, 1107, 1110

BIOG 1102 & 1104, 1106, 1108, 1109

BIOBM 3300, 3310 & 3320, 3330, NS 3200

BIOSM 3640, 3750

BIOSM 3760, BIOEE 3730

BIOLOGY & SOCIETY MAJOR

K. Vogel, director of undergraduate studies, College of Arts and Sciences; S. K. Obendorf, advising coordinator, College of Human Ecology; B. Chabot, advising coordinator, College of Agriculture and Life Sciences; E. Adkins-Regan, B. Bedford, W. Bemis, K. Berggren, R. Boyd, N. Breen, J. T. Brenna, D. Brown, R. Canfield, S. Ceci, B. Chabot, C. C. Chu, W. Crepet, J. Davis, P. Dear, R. Depue, G. W. Feigenson, J. Fortune, C. Geisler, W. Ghiorse, C. Goodale, C. Greene, D. Gurak, J. Haas, A. Hajek, L. Harrington, A. Hedge, S. Hilgartner, T. J. Hinrichs, B. Johnson, B. Knuth, A. Lemley, C. Leuenberger, D. Levitsky, B. Lewenstein, B. Lust, M. Lynch, K. McComas, S. McCouch, A. Netravali, S. K. Obendorf, P. Parra, A. Parrot, D. Pelletier, M. Pfeffer, T. Pinch, A. G. Power, R. Prentice, S. Pritchard, W. Provine, J. V. Reppy, S. Robertson, M. Rossiter, S. Seth, R. Stedman, R. Stoltzfus, J. Tantillo, J. Thies, V. Utermohlen, K. Vogel, R. Wayne, E. Wethington, T. Whitlow, S. Wolf. Emeritus: D. Baks, D. Bates, C. Eberhard, H. C. Howland, K. A. R. Kennedy, J. Fessenden MacDonal, J. Mueller, D. Pimentel, J. M. Stycos

The Biology & Society major is suited for students who wish to combine training in biology with perspectives from the social sciences and humanities on the social, political, and ethical aspects of modern biology. In addition to providing a foundation in biology, Biology & Society students gain a background in the social dimensions of modern biology and in the biological dimensions of contemporary social issues.

The Biology & Society major, which involves faculty from throughout the university, is offered by the Department of Science and Technology Studies. Students in the College of Arts and Sciences, the College of Human Ecology, and the College of Agriculture and Life Sciences are eligible for the major. The major is coordinated for students in all colleges through the Biology & Society Office. Students can get information, specific course requirements, and application procedures for the major from the Biology & Society office in 306 Rockefeller Hall, 255-6047.

Because the major is multidisciplinary, students must attain a basic understanding of the several disciplines it comprises. The curriculum includes courses in ethics; statistics; history,

philosophy, and social studies of science and biology; and basic biology (e.g., genetics and development; biochemistry and molecular-cell biology; ecology; evolutionary biology), as well as integrative courses offered through Biology & Society. Majors are required to take a core course and must develop a theme, an intellectually coherent grouping of courses representative of their special interest in Biology & Society. Recommended themes in the Biology & Society major include biology, behavior, and society; biology and human population; biology and public policy; environment and society; and health and society. Students may also develop their own individually tailored themes (which in recent years have included topics such as biotechnology and society and agriculture, environment, and society). In consultation with their faculty advisor, students select courses that meet the foundation and core course requirements so as to build a coherent theme. Sample curricula for the recommended themes and for several student-developed themes are available in the Biology & Society office.

Because of the interdisciplinary nature and flexibility of the Biology & Society major, we do not allow students to triple major.

Faculty members are available (according to posted office hours or by appointment) in the Biology & Society offices, 306 Rockefeller Hall, to answer questions and to provide assistance.

Admission to the Major

All students should have completed a year of college-level biology or two entry-level biology courses before submitting an application during their sophomore year. Juniors are considered on a case-by-case basis. Upper-division applicants should realize the difficulties of completing the major requirements in fewer than two years. Freshmen admitted to the Colleges of Agriculture and Life Sciences and Human Ecology as Biology & Society majors are considered to have been admitted to the major on a provisional basis, contingent on successful completion of the course requirement in introductory biology and submission of the application to the university major. The application includes (1) a one-page statement explaining the student's intellectual interests in the Biology & Society major and why the major is consistent with the student's academic goals and interests; (2) the theme the student wishes to pursue in the major; (3) a tentative plan of courses fulfilling Biology & Society requirements, including courses already taken and those the student plans to take; and (4) a transcript of work completed at Cornell University (and elsewhere, if applicable), current as of the date of application.

Acceptance into the major requires completion of the course sequence in introductory biology. Sophomores in the process of completing this prerequisite may be admitted to the major on a *provisional* basis. It is the student's responsibility to assure that final acceptance is granted upon satisfactory completion of the introductory biology requirement. Although only introductory biological science is a prerequisite for acceptance, students find it useful to have completed some of the other requirements (listed below) by the end of their sophomore year, preferably by the end of the first semester. Students who are considering the

major may also find it beneficial to take STS 2011, What Is Science?, in their freshman or sophomore year. Human Ecology students should also consult the current Human Ecology guide and meet with the college advising coordinator, Nancy Breen, 205 Martha Van Rensselaer Hall, 255-1928.

Major Requirements

No single course may satisfy more than one major requirement. All courses must be taken for a letter grade.

1. Basic courses

- BIOG 1101–1104 or 1105–1106 or 1107–1108 or BIOSM 1110 (prerequisite for admission to Biology & Society) or two entry-level biology courses.
- College calculus (one course):* MATH 1106, 1110, 1120 or any higher-level calculus.
- Recommended but not required: General chemistry (one-year sequence) (prerequisite to biochemistry and other chemistry courses): CHEM 1560, 2070–2080, or 2150–2160.

- Foundation Courses** (should be completed by end of junior year). Foundation courses are intended to provide a broad introduction to methodology and theory in their area.

These courses must be above the 1000 level, at least 3 credit hours, and taken for a letter grade.

- Ethics: one course; BSOC 2051 (also STS 2051) or BSOC 2061 (also STS 2061, PHIL 2460).
- Social sciences/humanities foundation: two courses; one from any two of the following subject areas: history of science; philosophy of science; sociology of science; politics of science; and science communication.
- Biology foundation (breadth requirement): three courses; one each from three of the following subject areas: biochemistry, molecular and cell biology (BIOBM 3300 or 3310 or 3330 or NS 3200); ecology (BIOEE 2610, BIOSM 3640, BIOSM 3750); genetics and development (BIOGD 2800 or 2810 or 2820 or PLBR 2250 or NTRES 2830); evolutionary biology (BIOEE 2780); animal behavior (BIONB 2210, BIOSM 3290); neurobiology (BIONB 2220); anatomy and physiology (BIOAP 3110 or NS 3410); biological diversity (BIOPL 2410 or BIOMI 2900 or BIOEE 3730 or 2740 or 4500 or 4700 and 4701 or 4750 or 4760 or BIOSM 3080 or BIOSM 3210 or ENTOM 2120 or PLPA 3010 or 3090 or BIOSM 3100 or 3740 or 3770 or 4490); nutrition (NS 1150 or NS 1220).
- Biology foundation (Depth requirement): one biology course for which one of the above (2c) is a prerequisite.**
- Statistics: one course selected from MATH 1710, BTRY 3010, AEM 2100, SOC 3010, PSYCH 3500, ECON 3190, PAM 2100, ILRST 2100 or 2120.

- Core Course: (one course).** Should be completed by end of junior year.
BSOC 3011 Life Sciences and Society (also STS 3011); or STS 2861 Science and Human Nature (also PHIL 2860).
- Theme** (five courses that correspond to the theme selected by the student). These courses can be above the 1000 level, at least 3 credit hours, and taken for a letter grade. Choose these courses as follows:
 - Natural science issues/biology elective (two courses). Select from the list of BSOC-approved natural science issues courses or choose course(s) with introductory biology as a prerequisite.
 - Humanities/social sciences electives (two courses). Courses from the list of senior seminars may be used as theme electives if not used to meet another requirement, or select humanities or social sciences courses in consultation with the faculty advisor.
 - Senior seminar (one course taken senior year). Courses change yearly.

* Students may petition to take a second statistics course (an advanced course, in sequence with the statistics course taken in the foundation) in place of the calculus requirement.

** A list of approved depth courses using NS 1150 and NS 1220 as a prerequisite is available in 306 Rockefeller Hall.

Independent Study

Projects under the direction of a Biology & Society faculty member are encouraged as part of the program of study in the student's theme area. Applications for research projects are accepted by individual faculty members. Students may enroll for 1–4 credits in BSOC 3751 Independent Study with written permission of the faculty supervisor and may elect either the letter grade or the S–U option. Applications and information on faculty research, scholarly activities, and undergraduate opportunities are available in the Biology & Society office, 306 Rockefeller Hall.

The Honors Program

The honors program is designed to provide independent research opportunities for academically talented undergraduate students whose major is Biology & Society (BSOC). Students who enroll in the honors program are expected, with faculty guidance, to do independent study and research dealing with issues in Biology & Society. Students participating in the program should find the experience intellectually stimulating and rewarding whether or not they intend to pursue a research career.

Biology & Society majors are considered for entry into the honors program at the end of the second semester of the junior year. Application forms for the honors program are available in the Biology & Society office, 306 Rockefeller Hall. The honors program is available to Biology & Society majors from the Colleges of Arts and Sciences and Agriculture and Life Sciences. Biology & Society majors in the College of Human Ecology must be selected by an honors committee within their college. To qualify for the Biology & Society honors program, students must have an

overall Cornell cumulative grade point average (GPA) of at least 3.3, have formulated a research topic, and have found a project supervisor (with an academic appointment at Cornell) and another faculty member willing to serve as their advisors. At least one of these must be a member of the Biology & Society major. Applications will be reviewed by a committee headed by the director of undergraduate studies, who will notify students directly of the outcome. Students will be permitted to register for the honors program only by permission of the department. Students must enroll for both the fall and spring semesters. BSOC 4991/4992 is now cross-listed with the College of Agriculture and Life Sciences as ALS 4991/4992 and the College of Human Ecology as HE 4990. Students wishing to receive CALS credit can sign up for ALS 4991/4992 and those wishing to receive Human Ecology credit must sign up for HE 4990. They must attend the honors seminar during the fall semester. More information on the honors program is available in the Biology & Society Office, 306 Rockefeller Hall, 255-6047.

People to contact for Biology & Society honors information:

In Arts and Sciences: Kathleen Vogel, director of undergraduate studies, kmv8@cornell.edu

In Agriculture and Life Sciences: Brian Chabot, faculty representative to CALS Honors Committee, bfc1@cornell.edu

In Human Ecology: S. Kay Obendorf, advising coordinator, CHE, sko3@cornell.edu

Further Information

Professor Kathleen Vogel, director of undergraduate studies, kmv8@cornell.edu

Professor Brian Chabot, advising coordinator, College of Agriculture and Life Sciences, bfc1@cornell.edu

S. Kay Obendorf, advising coordinator, College of Human Ecology, sko3@cornell.edu

Susan Sullivan, Biology & Society Advising Office, 306 Rockefeller Hall, 255-6047, sfc1@cornell.edu

web site: www.sts.cornell.edu

I. First-Year Writing Seminars

Consult the John S. Knight Institute web site for times, instructors, and descriptions. Web site: www.arts.cornell.edu/Knight_institute/index.html.

II. Introductory Courses

[STS 1101 Science and Technology in the Public Arena (SBA-AS)]

Fall. 3 credits. Recommended as introduction to field. Not required; may not be used to fulfill major requirement. STS 1101 and 1102 can be taken separately or in any order. Next offered 2011–2012.

J. Reppy.

For description, see STS listings, STS 1101.]

STS 1102 Histories of the Future (also HIST 1620) (CA-AS)]

Spring. 3 credits. Recommended as an introduction to the field. Not required; may not be used to fulfill a major requirement. STS 1101 and 1102 may be taken separately or in any order. R. Prentice.

For description, see STS listings, STS 1102.

III. Foundation Courses

A. Ethics (one course)

BSOC 2051 Ethical Issues in Health and Medicine (also STS 2051) (KCM-AS)

Fall. 4 credits. Limited to 150 students. Not open to freshmen. S. Hilgartner.

In today's rapidly changing world of health and medicine, complex ethical issues arise in many contexts—from the private, interpersonal interactions between doctor and patient to the broad, mass-mediated controversies that make medicine into headline news. This course examines ethical problems and policy issues that arise in contemporary medicine, health care, and biomedical research. Tools for ethical analysis are applied to a variety of cases and fundamental questions in bioethics. Perspectives from social science, history, and law also inform the course. The course explores ethical questions that arise in a number of substantive contexts, including the doctor-patient relationship, medical decision making near the end of life, human experimentation, genetics and reproductive technology, public health, and the allocation of scarce resources.

BSOC 2061 Ethics and the Environment (also PHIL 2460, STS 2061) (KCM-AS)
Spring. 4 credits. Open to all undergraduates; freshmen by permission of instructor. S. Pritchard.

Politicians, scientists, and citizens worldwide face many environmental issues today, but they are neither simple nor straightforward. Moreover, there are many ways to understand how we have, do, and could value the environment from animal rights and wise use to deep ecology and ecofeminism. This class acquaints students with some of the challenging moral issues that arise in the context of environmental management and policy-making, both in the past and the present. Environmental concerns also highlight important economic, epistemological, legal, political, and social issues in assessing our moral obligations to nature as well as other humans. This course examines various perspectives expressed in both contemporary and historical debates over environmental ethics by exploring four central questions: What is nature? Who counts in environmental ethics? How do we know nature? Whose nature?

B. Social Sciences/Humanities

Foundation (two courses, one from any two areas)

1. History of Science

HIST 3150 Environmental History: The U.S. and the World (also AMST 3150)

Fall. 4 credits. A. Sachs.
For description, see HIST 3150.

NTRES 2320 Nature and Culture

Spring. 3 credits. J. Tantillo.
For description, see NTRES 2320.

NTRES 3320 Introduction to Ethics and Environment

Fall. 4 credits. J. Tantillo.
For description, see NTRES 3320.

STS 2331 Agriculture, History, and Society: From Squanto to Biotechnology

Fall. 3 credits. M. Rossiter.
For description, see STS 2331.

[STS 2811 Science in Western Civilization: Medieval and Early-Modern Europe up to Isaac Newton (also HIST 2810) # (HA-AS)]

Fall. 4 credits. May be taken for Foundation credit if course time period better meets students theme/interest, STS 2821 preferred for major. Next offered 2010-2011. P. Dear.]

STS 2821 Science in Western Civilization: Newton to Darwin, Darwin to Einstein (also HIST 2820)

Spring. 4 credits. S. Seth.
For description, see HIST 2820.

STS 2871 Evolution (also BIOEE 2070, HIST 2870)

Fall or summer. 3 credits. May not be taken for credit after BIOEE 2780. W. Provine.

For description, see BIOEE 2070.

[STS 3551 Computers: From the 17th Century to the Dotcom Boom (also COMM/INFO 3551)]

Fall. 4 credits. STS 3551 and 3561 may be taken separately or in any order. Next offered 2011-2012. Staff.

For description, see STS listings, STS 3551.]

STS 3561 Computing Cultures (also COMM/INFO 3561, VISST 3560)

Spring. 4 credits. STS 3551 and 3561 may be taken separately or in any order. R. Prentice.

For description, see STS listings, STS 3561.

STS 4331 International History of Science

Spring. 4 credits. M. Rossiter.
For description, see STS listings, STS 4331.

STS 4441 Historical Issues of Gender and Science (also FGSS 4440)

Spring. 4 credits. M. Rossiter.
For description, see STS listings, STS 4441.

STS 4471 Seminar in the History of Biology (also BIOEE 4670, BSOC 4471, HIST 4150)

Fall or summer (six-week session). 4 credits. Limited to 18 students. S-U or letter grades. W. Provine.
For description and prerequisites, see BIOEE 4670.

2. Philosophy of Science

STS 2011 What Is Science? An Introduction to the Social Studies of Science and Technology (also SOC 2100)

Spring. 3-4 credits. K. Vogel.
For description, see STS listings, STS 2011.

STS 2861 Science and Human Nature (also PHIL 2860)

Spring. 4 credits. May be used to meet philosophy of science requirement if not used to meet core course requirement. R. Boyd.

For description, see PHIL 2860.

STS 3811 Philosophy of Science: Knowledge and Objectivity (also PHIL 3810)

Fall. 4 credits. R. Boyd.
For description, see PHIL 3810.

3. Sociology of Science

BSOC 2201 Society and Natural Resources under Sociology of Science (also DSOC/NTRES 2201)

Spring. 3 credits. R. Stedman.
For description, see NTRES 2201.

BSOC 3011 Life Sciences and Society (also STS 3011) (SBA-AS)

Fall. 4 credits. May be used to meet sociology of science requirement *if not* used to meet core course requirement. M. Lynch.

For description, see "Core Courses," BSOC 3011.

[BSOC 3311 Environmental Governance (also NTRES 3310, STS 3311) (CA-AS)]

Spring. 3 credits. Next offered 2010-2011. S. Wolf.

For description see NTRES 3310.]

[BSOC 4421 Sociology of Science (also CRP/SOC 4420, STS 4421)]

Fall. 4 credits. Next offered 2011-2012. T. Pinch.

For description, see STS 4421.]

DSOC 2200 Sociology of Health and Ethnic Minorities (also LSP 2200)

Fall. 3 credits. P. Parra.
For description, see DSOC 2200.

HD 4520 Culture and Human Development

Fall. 3 credits. Q. Wang.
For description, see HD 4520.

NS 2450 Social Science Perspectives on Food and Nutrition

Fall. 3 credits. C. Bisogni and J. Sobal.
For description and prerequisites, see NS 2450.

STS 2011 What Is Science? An Introduction to the Social Studies of Science and Technology (also SOC 2100)

Spring. 3 credits. K. Vogel.
For description, see STS listings, STS 2011.

STS 3111 The Sociology of Medicine (also SOC 3130)

Fall. 4 credits. Not open to freshmen. C. Leuenberger.
For description, see STS listings, STS 3111.

[STS 4111 Knowledge, Technology, and Property

Spring. 4 credits. Next offered 2011-2012. S. Hilgartner.

For description, see STS 4111.]

4. Politics of Science

[BSOC 3311 Environmental Governance (also NTRES 3310, STS 3311)]

Spring. 3 credits. Next offered 2010-2011. S. Wolf.

For description see NTRES 3310.]

BSOC 4071 Law, Science, and Public Values (also STS 4071)

Spring. 4 credits. M. Lynch.
For description, see STS listings, STS 4071.

CRP 3800 Environmental Politics

Fall. 4 credits. R. Booth.
For description, see CRP 3800.

PAM 2300 Introduction to Policy Analysis

Fall and spring. 4 credits. R. Avery and J. Gerner.

For description, see PAM 2300.

STS 3241 Environment and Society (also DSOC/SOC 3240)

Fall. 3 credits. G. Gillespie.
For description, see DSOC 3240.

[STS 3911 Science in the American Polity: 1960 to Now (also AMST 3911, GOVT 3091)]

Spring. 4 credits. Next offered 2010–2011.
J. Reppy.
For description, see STS 3991.]

5. Science Communication**COMM 4210 Communication and the Environment**

Spring. 3 credits. May be used in Foundation only if **not** taken as senior seminar. Offered odd-numbered years.
K. McComas.
For description, see COMM 4210.

STS 2851 Communication, Environment, Science, and Health (also COMM 2850)

Spring. 3 credits. B. Lewenstein.
For description, see COMM 2850.

[STS 3521 Science Writing for the Mass Media (also COMM 3520)]

Fall. 3 credits. Next offered 2010–2011.
B. Lewenstein.
For description and prerequisites, see COMM 3520.]

STS 4661 Public Communication of Science and Technology (also COMM 4660/6660, STS 6661)

Spring. 3 credits. Limited to 15 students. May be used in Foundation only if **not** taken as senior seminar. Offered even-numbered years. B. Lewenstein.
For description and prerequisites, see COMM 4660.

C. Biology Foundation (breadth requirement): Three courses: one from three of the following subject areas:

1. Biochemistry, Molecular and Cell Biology**BIOBM 3300 Principles of Biochemistry, Individualized Instruction**

Fall and spring. 4 credits. J. Blankenship, P. Hinkle, and staff.
For description and prerequisites, see BIOBM 3300.

BIOBM 3310 Principles of Biochemistry: Proteins and Metabolism

Fall. 3 credits. May not be taken for credit after BIOBM 3300 or 3330. G. Feigenson.
For description and prerequisites, see BIOBM 3310.

BIOBM 3330 Principles of Biochemistry, Lectures

Summer, six-week session. 4 credits. S. Ely.
For description and prerequisites, see BIOBM 3330.

NS 3200 Introduction to Human Biochemistry

Fall. 4 credits. P. Stover.
For description and prerequisites, see NS 3200.

2. Ecology**BIOEE 2610 Ecology and the Environment**

Fall. 4 credits. Not open to freshmen. Staff.
For description and prerequisites, see BIOEE 2610.

BIOSM 3640 Field Marine Science

Summer. 6 credits. Taught at Shoals Marine Laboratory; for more information and application, contact the SML office at G14 Stimson Hall. Staff.

For description and prerequisites, see BIOSM 3640.

BIOSM 3750 Field Marine Biology and Ecology

Summer. 6 credits. Taught at Shoals Marine Laboratory; for more information and application, contact the SML office at G14 Stimson Hall. Staff.

For description and prerequisites, see BIOSM 3750.

3. Genetics and Development**BIOGD 2800 Lectures in Genetics**

Fall, spring, and summer. 3 credits. T. Fox, R. MacIntyre, and D. Nero.
For description and prerequisites, see BIOGD 2800.

BIOGD 2810 Genetics

Fall, spring, and summer. 5 credits. Limited to 200 students. Not open to freshmen fall semester. T. Fox, R. MacIntyre, and D. Nero.

For description and prerequisites, see BIOGD 2810.

BIOGD 2820 Human Genetics

Spring. 2 or 3 credits (2 credits if taken after BIOGD 2810); must be taken for 3 credits to fulfill Biology & Society requirements. Limited to 25 students per disc. M. Goldberg.

For description and prerequisites, see BIOGD 2820.

NTRES 2830 Genetics for Population Biologists

Fall. 3 credits. M. Hare.
For description, see NTRES 2830.

PLBR 2250 Plant Genetics

Spring. 3 credits. Staff.
For description, see PLBR 2250.

4. Evolutionary Biology**BIOEE 2780 Evolutionary Biology**

Fall or spring. 3 or 4 credits. Fall, M. Geber; spring, staff.
For description, see BIOEE 2780.

5. Animal Behavior**BIONB 2210 Neurobiology and Behavior I: Introduction to Behavior**

Fall. 3, 4, or 5 credits. K. Shaw and staff.
For description and prerequisites, see BIONB 2210.

BIOSM 3290 Ecology of Animal Behavior

Summer. 3, 4, or 5 credits. Taught at the Shoals Marine Laboratory; for more information, contact SML office at G14 Stimson Hall. Staff.

For description and prerequisites, see BIOSM 3290.

6. Neurobiology**BIONB 2220 Neurobiology and Behavior II: Introduction to Neurobiology**

Spring. 3 or 4 credits. J. R. Fetcho and staff.
For description and prerequisites, see BIONB 2220.

7. Physiology and Anatomy**BIOAP 3110 Introductory Animal Physiology, Lectures (also VTBSM 3460)**

Fall. 3 credits. M. Baustian.
For description and prerequisites, see BIOAP 3110.

NS 3410 Human Anatomy and Physiology

Spring. 3 credits. K. O'Brien.
For description, see NS 3410.

8. Biological Diversity**BIOEE 2740 The Vertebrates: Structure, Function, and Evolution**

Spring. 4 credits. B. McGuire.
For description and prerequisites, see BIOEE 2740.

BIOEE 3730 Biology of the Marine Invertebrates

Fall. 5 credits. D. Harvell.
For description and prerequisites, see BIOEE 3730.

[BIOEE 4500 Mammalogy (Lecture)]

Spring. 3 credits. Next offered 2010–2011.
B. A. McGuire.
For description and prerequisites, see BIOEE 4500.]

[BIOEE 4700 Herpetology, Lectures

Spring. 2 credits; must be taken in conjunction with 4701 to count for major credit. Offered alternate years; next offered 2010–2011. H. Greene.
For description and prerequisites, see BIOEE 4700.]

[BIOEE 4701 Herpetology, Laboratory

Spring. 2 credits; must be taken in conjunction with 4700 to count for major credit. Offered alternate years; next offered 2010–2011. H. Greene.
For description and prerequisites, see BIOEE 4701.]

BIOEE 4750 Ornithology

Spring. 4 credits. D. Winkler.
For description and prerequisites, see BIOEE 4750.

[BIOEE 4760 Biology of Fishes

Fall. 4 credits. Next offered 2010–2011.
A. McCune.
For description and prerequisites, see BIOEE 4760.]

BIOMI 2900 General Microbiology Lectures

Fall, spring, and summer. 2 or 3 credits; must be taken for 3 credits to fulfill major requirement. B. Batzing (summer) and W. Ghiorse.
For description and prerequisites, see BIOMI 2900.

BIOPL 2410 Introductory Botany

Fall. 3 credits. K. Niklas.
For description, see BIOPL 2410.

BIOSM 3080 Field Microbial Ecology

Summer. 4 credits. Taught at Shoals Marine Laboratory, N.H. L. Zettler and E. Zettler.
For more information, contact the SML office at G14 Stimson Hall.

BIOSM 3100 Marine Symbiosis

Summer. 4 credits. Taught at Shoals Marine Laboratory, N.H. For more information, contact SML office at G14 Stimson Hall. Staff.
For description and prerequisites, see BIOSM 3100.

BIOSM 3210 Anatomy and Function of Marine Vertebrates

Summer. 4 credits. Prerequisite: one year biology. Taught at Shoals Marine Laboratory, N.H. F. Fish and W. Bemis.

For more information, contact the SML office at G14 Stimson Hall.

BIOSM 3740 Field Ornithology

Summer. 4 credits. Taught at Shoals Marine Laboratory, N.H.; for more information, contact SML office at G14 Stimson Hall. Staff.

For description and prerequisites, see BIOSM 3740.

BIOSM 3770 Diversity of Fishes

Summer. 4 credits. Taught at Shoals Marine Laboratory, N.H.; for more information, contact SML office at G14 Stimson Hall. Staff.

For description and prerequisites, see BIOSM 3770.

BIOSM 4490 Seaweeds, Plankton, and Seagrass: the Ecology and Systematics of Marine Plants

Summer. 4 credits. Taught at Shoals Marine Laboratory, N.H.; for more information, contact SML office at G14 Stimson Hall. Staff.

For description and prerequisites, see BIOSM 4490.

ENTOM 2120 Insect Biology

Fall. 4 credits. J. P. Sanderson.

For description and prerequisites, see ENTOM 2120.

PLPA 3010 Biology and Management of Plant Diseases

Fall. 3 credits. W. Fry.

For description, see PLPA 3010.

[PLPA 3090 Fungi

Fall. 3 credits. Next offered 2010–2011. K. Hodge.

For description and prerequisites, see PLPA 3090.]

9. Nutrition**NS 1120 Nutrition and the Life Cycle**

Spring. 3 credits. P. Brannon.

For description, see NS 1120.

NS 1150 Nutrition, Health, and Society

Fall. 3 credits. D. Levitsky.

For description, see NS 1150.

D. Biology Foundation (depth requirement): one course for which one of the above breadth requirement courses (2C) is a prerequisite.

E. Statistics (one course)**AEM 2100 Introductory Statistics**

Spring. 4 credits. C. VanEs.

For description and prerequisites, see AEM 2100.

BTRY 3010 Statistical Methods I

Fall and summer. 4 credits. Fall, P. Sullivan; summer: F. King.

For description and prerequisites, see BTRY 3010.

ECON 3190 Introduction to Statistics and Probability

Fall. 4 credits. Y. Hong.

For description and prerequisites, see ECON 3190.

ILRST 2100 Introductory Statistics (also STSCI 2100)

Spring. 4 credits. Staff.

For description, see ILRST 2100.

MATH 1710 Statistical Theory and Application in the Real World

Fall and spring. 4 credits. Staff.

For description, see MATH 1710.

PAM 2100 Introduction to Statistics

Fall and spring. 4 credits. J. Lewis, T. Evans, and staff.

For description, see PAM 2100.

PSYCH 3500 Statistics and Research Design

Fall. 4 credits. J. Schwade.

For description, see PSYCH 3500.

SOC 3010 Evaluating Statistical Evidence

Fall. 4 credits. Limited to Arts and Sciences students. M. Brashears.

For description, see SOC 3010.

IV. Core Courses**BSOC 3011 Life Sciences and Society (also STS 3011) (SBA-AS)**

Fall. 4 credits. M. Lynch.

Critical thinking about the diverse influences shaping the life sciences. Topics include evolution and natural selection, heredity and genetic determinism, biotechnology, and reproductive interventions. Students interpret episodes, past and present, in biology in light of scientists' historical location, economic and political interests, use of language, and ideas about causality and responsibility. Readings, class activities, and written assignments are designed so that students develop interpretive skills and explore their own intellectual and practical responses to controversies in biology and society.

STS 2861 Science and Human Nature (also PHIL 2860) (KCM-AS)

Spring. 4 credits. R. Boyd.

For description, see PHIL 2860.

V. Themes**A. Natural Science Issues/Biology**

Elective (two courses). Select from the following list of BSOC-approved natural science issues courses or choose course(s) with intro biology as a prerequisite.

BEE 3299 Sustainable Development

Spring. 3 credits. Web-based course.

N. Scott.

For description and more information, see BEE 3299.

[BIOEE 6730 Human Evolution: Concepts, History, and Theory (also ANTHR 6373)

Fall. 3 credits. Next offered 2010–2011.

K. Kennedy.

For description, see BIOEE 6730.]

BIOG 3050 Basic Immunology (also VETMI 3150)

Fall. 3 credits. J. Appleton.

For description, see BIOG 3050.

[BIOPL 2470 Ethnobiology

Fall. 3 credits. Offered alternate years; next offered 2010–2011. Staff.

For description, see BIOPL 2470.]

BIOSM 2770 Intro to Marine Conservation Biology

Summer, two-week session. 4 credits.

Prerequisite: one year biology. Taught at Shoals Marine Laboratory, N.H. H. Weeks and K. Flessa.

For more information, contact the SML office at G14 Stimson Hall.

BIOSM 3220 Ecology of Biological Invasions

Summer, two-week session. 4 credits.

Prerequisite: one year biology. Taught at Shoals Marine Laboratory, N.H. R. Seeley and J. Dijkstra.

For more information, contact the SML office at G14 Stimson Hall.

BIOSM 4720 Genetics of Marine Diversity

Summer, two-week session. 4 credits.

Prerequisite: one year biology. Taught at Shoals Marine Laboratory, N.H. A. Sherlock.

For more information, contact the SML office at G14 Stimson Hall.

BME 4110 Science and Technology Approaches to Problems in Human Health

Fall. 3 credits. C. B. Schaffer and

M. G. Kaplitt.

For description, see BME 4110.

BSOC 2101 Plagues and People (also ENTOM 2100)

Fall. 3 credits. L. Harrington.

For description, see ENTOM 2100.

BSOC 2141 Biological Basis of Sex Differences (also BIOAP/FGSS 2140) (PBS)

Fall. 3 credits. Offered even-numbered years. J. Fortune.

For description, see BIOAP 2140.

BSOC 3441 Insect Conservation Biology (also ENTOM 3440)

Spring. 3 credits. J. Losey.

For description, see ENTOM 3440.

[BSOC 3471 Human Growth and Development: Biological and Behavioral Interactions (also HD/NS 3470)

Spring. 3 credits. Offered alternate years; next offered 2010–2011. J. Haas and S. Robertson.

For description and prerequisites, see HD 3470.]

EAS 3220 Biogeochemistry of the Hawaiian Islands

Spring. 4 credits. Prerequisites: enrollment in EES Semester in Hawaii; EAS 2200, EAS 3030, or permission of instructor. L. Derry.

For description, see EAS 3220.

EAS 3510 Marine Ecosystems Field Course

Spring. 4 credits. Prerequisites: EAS 2400; enrollment in EES Semester in Hawaii.

Recommended: oceanography course.

C. Greene, B. Monger, and C. D. Harvell.

For description, see EAS 3510.

ENTOM 2020 Invasions

Spring. 3 credits. A. Hajek and J. Nyrop.

For description, see ENTOM 2020.

ENTOM 2770 Natural Enemies and Invasive Species

Spring. 2–3 credits (Biology & Society students must take 3-credit option).

J. P. Nyrop.

For description, see ENTOM 2770.

ENTOM 3520 Medical and Veterinary Entomology

Fall. 3 credits. L. Harrington.
For description, see ENTOM 3520.

FSAD 4390 Biomedical Materials and Devices for Human Body Repair

Spring. 3 credits. C. Chu.
For description, see FSAD 4390.

[HD 2200 The Human Brain and Mind: Biological Issues in Human Development]

Fall. 3 credits. Next offered 2010–2011.
Staff.
For description, see HD 2220.]

HD 2600 Introduction to Personality (also PSYCH 2750)

Fall. 3 credits. V. Zayas.
For description, see HD 2600.

[HD 3200 Human Developmental Neuropsychology: Neurobiology of Human Diseases and Disorders]

Spring. 3 credits. Next offered 2010–2011.
Staff.
For description, see HD 3200.]

[HD 3370 Language Development (also COGST/PSYCH 4360, LING 4436)]

Spring. 4 credits. Next offered 2010–2011.
B. Lust.
For description, see HD 3370.]

HD 3440 Infant Behavior and Development

Fall. 3 credits. Not open to freshmen.
S. Robertson.
For description and prerequisites, see HD 3440.

HD 3660 Emotional Functions of the Brain

Spring. 3 credits. R. Depue.
For description, see HD 3660.

HD 4260 Translational Research in Memory and Neuroscience

Fall. 4 credits. C. Brainerd.
For description, see HD 4260.

[HD 4330 Developmental Cognitive Neuroscience]

Spring. 3 credits. May be used as depth course if BIONB 2210 or 2220 taken as breadth. Next offered 2010–2011. Staff.
For description, see HD 4330.]

[HD 4660 Psychobiology of Temperament and Personality]

Fall. 3 credits. Next offered 2010–2011.
R. DePue.
For description and prerequisites, see HD 4660.]

NS 2750 Human Biology and Evolution (also ANTHR 2750)

Fall. 3 credits. J. Haas and Z. Gu.
For description, see NS 2750.

NS 3150 Obesity and the Control of Body Weight

Spring. 3 credits. Staff.
For description see NS 3150.

NS 3220 Maternal and Child Nutrition

Spring. 3 credits. Limited to 25 students.
P. Brannon.
For description and prerequisites, see NS 2220.

NS 3310 Physiological and Biochemical Bases of Human Nutrition

Spring. 4 credits. C. McCormick.
For description and prerequisites, see NS 3310.

NS 3500 Epidemiology in Context

Spring. 3 credits. D. Pelletier.
For description and prerequisites, see NS 3500.

[NS 3610 Biology of Normal and Abnormal Behavior (also PSYCH 3610)]

Spring. 3 credits. Prerequisite: junior or senior standing. Next offered 2010–2011.
B. Strupp.
For description and prerequisites, see NS 3610.]

[NS 4210 Nutrition and Exercise]

Spring. 3 credits. Next offered 2011–2012.
S. Travis.
For description, see NS 4210.]

[NS 4750 Mechanisms of Birth Defects]

Spring. 3 credits. Next offered 2011–2012.
P. Stover.
For description and prerequisites, see NS 4750.]

NTRES 2010 Environmental Conservation

Spring. 3 credits. T. Fahey.
For description, see NTRES 2010.

[NTRES 4280 Principles and Practices of Applied Wildlife Science]

Spring. 3 credits. Offered alternate years; next offered 2011–2012. Staff.
For description, see NTRES 4280.]

PSYCH 2230 Introduction to Biopsychology

Fall. 3 credits. D. Smith.
For description, see PSYCH 2230.

PSYCH 3260 Evolution of Human Behavior

Spring. 4 credits. B. Johnston.
For description and prerequisites, see PSYCH 3260.

Examples of biology electives**ANSC 2400 Animal Reproduction and Development**

Spring. 3 credits. J. Parks.
For description, see ANSC 2400.

ANSC 2410 Animal Reproduction and Development Lab

Spring. 1 credit. J. Parks.
For description, see ANSC 2410.

[HD 4660 Psychobiology of Temperament and Personality]

Fall. 3 credits. Next offered 2010–2011.
R. DePue.
For description and prerequisites, see HD 4660.]

NS 3310 Physiological and Biochemical Bases of Human Nutrition

Spring. 4 credits. C. McCormick.
For description, see NS 3310.

B. Humanities/Social Science Elective
(two courses)

Courses listed earlier as social science/humanities foundation courses (2B) are particularly appropriate as social science/humanities electives. However, a single course cannot be used to meet both requirements. Examples of recommended social science or humanities electives are listed below. A more complete list is available in 306 Rockefeller Hall.

Examples of social science electives**AEM 4640 Economics of Agricultural Development (also ECON 4640)**

Fall. 3 credits. R. Christy.
For description, see AEM 4640.

ALS 4000 Community Service Learning Project

Fall and spring. 3 credits. Prerequisite: permission of instructor. Mandatory organizational meeting on August 31, 4:30 p.m., 102 Mann Library. B. Chabot.
For more information, see ALS 4000.

ANTHR 2411 Nature and Culture

Spring. 4 credits. S. Sangren.
For description, see ANTHR 2411.

ANTHR 4900 Primate Conservation: Cross-Cultural Perspectives on Wilderness Preservation and Human-Animal Coexistence

Spring. 4 credits. A. Arcadi.
For description see ANTHR 4900.

BEE 3299 Sustainable Development

Spring. 3 credits. Web-based course.
N. Scott.
For description and more information, see BEE 3299.

[BIOEE 6710 Paleoanthropology of South Asia (also ANTHR 6371, ASIAN 6671)]

Fall. 3 credits. Next offered 2010–2011.
K. Kennedy.
For description, see BIOEE 6710.]

NS 2600 Introduction to Global Health

Spring. 3 credits. R. Stoltzfus.
For description, see NS 2600.

[BSOC 3311 Environmental Governance (also NTRES 3310, STS 3311)]

Fall. 3 credits. Next offered 2010–2011.
S. Wolf.
For description, see NTRES 3310.]

BSOC 3431 Biotechnology and the Economy (also STS 3431) (SBA-AS)

Fall. 4 credits. J. Reppy.
For description, see STS 3431.

BSOC 4351 Postcolonial Science (also ANTHR 4435/7435)

Spring. 4 credits. S. Langwick.
For description, see ANTHR 4435.

CRP 4510 Environmental Law (also CRP 5510)

Fall. 4 credits. R. Booth.
For description, see CRP 4510.

DEA 4100 Facility Planning and Design in a Diverse Society

Spring. 3 credits. L. Maxwell.
For description, see DEA 4100.

DEA 4150 Strategic Planning for Health Care and Educational Facilities

Spring. 3 credits. L. Maxwell.
For description, see DEA 4150.

DEA 4220 Ecological Literacy in Design (also ARCH 4264)

Spring. 3 credits. J. Elliott.
For description, see DEA 4220.

DSOC 2010 Population Dynamics (also SOC 2202)

Spring. 3 credits. A. Basu and D. Brown.
For description, see DSOC 2010.

DSOC 2050 Rural Sociology and International Development (also SOC 2060)

Spring. 3 credits. P. McMichael.
For description, see DSOC 2050.

DSOC 2650 Latinos in the U.S.A. (also LSP 2010)

Spring. 3 credits. H. Velez-Guadalupe.
For description see DSOC 2650.

DSOC 4100 Health and Survival Inequalities (also FGSS/SOC 4100)

Fall. 4 credits. A. Basu.
For description, see DSOC 4100.

DSOC 4210 Theories of Reproduction (also FGSS/SOC 4210)

Spring. 4 credits. A. Basu.
For description see DSOC 4210.

HD 2510 Social Gerontology: Aging and the Life Course

Spring. 3 credits. Limited to 60 students. Highly recommended: HD 2500 or equivalent, to be determined by instructor. E. Wethington.
For description and prerequisites, see HD 2510.

HD 2600 Introduction to Personality (also PSYCH 2750)

Fall. 3 credits. V. Zayas.
For description, see HD 2600.

HD 3190 Memory and the Law

Fall. 3 credits. C. Brainerd.
For description, see HD 3190.

[HD 3360 Connecting Social, Cognitive, and Emotional Development

Fall. 3 credits. Next offered 2010–2011. P. Casasola.
For description and prerequisites, see HD 3360.]

HD 3430 Social Worlds of Childhood

Spring. 4 credits. J. Ross-Bernstein.
For description, see HD 3430.

HD 3570 Social Inequalities in Physical and Mental Health

Fall. 3 credits. E. Wethington.
For description, see HD 3570.

HD 3620 Human Bonding

Spring. 3 credits. C. Hazan.
For description, see HD 3620.

HD 3700 Adult Psychopathology (also PSYCH 3250)

Spring. 3 credits. H. Segal.
For description, see HD 3700.

HD 4260 Translational Research in Memory and Neuroscience

Fall. 4 credits. C. Brainerd.
For description, see HD 4260.

HD 4570 Health and Social Behavior (also SOC 4570)

Fall. 3 credits. E. Wethington.
For description, see HD 4570.

NS 3150 Obesity and the Control of Body Weight

Spring. 3 credits. Staff.
For description see NS 3150.

[NS 4210 Nutrition and Exercise

Spring. 3 credits. Limited to nutrition majors, others by permission of instructor. Next offered 2011–2012. S. Travis.
For description and prerequisites, see NS 4210.]

NS 4570 Health, Poverty and Inequality: A Global Perspective

Spring. 3 credits. D. Sahn.
For description see NS 4570.

[NS 6500 Food and Nutrition Assessment in a Social Context

Fall. 3 credits. Next offered 2011–2012. D. Pelletier and G. Peltó.
For description and prerequisites, see NS 6500.]

[NTRES 4310 Environmental Strategies (also DSOC 4320)

Spring. 3 credits. Next offered 2010–2011. S. Wolf.
For description, see NTRES 4310.]

PAM 2350 U.S. Health Care System

Spring. 3 credits. S. Nicholson.
For description, see PAM 4350.

PAM 3370 Race and Public Policy (also SOC 3370)

Fall. 3 credits. A. Sassler.
For description, see PAM 3370.

PAM 3500 Contemporary Issues in Women's Health (also FGSS 3500)

Spring. 3 credits. A. Parrot.
For description, see PAM 3500.

PAM 3800 Human Sexuality

Spring. 4 credits. A. Parrot.
For description, see PAM 3800.

PAM 4370 Economics of Health Policy

Fall. 3 credits. K. Simon.
For description and prerequisites, see PAM 4370.

Examples of humanities electives**PHIL 2410 Ethics**

Fall. 4 credits. T. Irwin.
For description, see PHIL 2410.

STS 4811 Problems in the Philosophy of Science (also PHIL 4810, STS 6811)

Spring. 4 credits. R. Boyd and A. Chignell.
For description, see PHIL 4810.

C. Senior Seminars**ASRC 4606 The Family and Society in Africa**

Summer. 3 credits. N. Assié-Lumumba.
For description, see ASRC 4606.

BSOC 3181 Living in an Uncertain World: Science, Technology, and Risk (also STS 3181)

Fall. 4 credits. S. Pritchard.
For description, see STS 3181.

[BSOC 4021 Bodies in Medicine, Science, and Technology (also FGSS/STS 4021) (sr sem) (CA-AS)

Spring. 4 credits. Next offered 2010–2011. R. Prentice.
For description, see STS 4021.]

BSOC 4111 Vitality and Power in China (also HIST/STS 4111, SHUM 4931)

Spring. 4 credits. Limited to 15 students. T. J. Hinrichs.
For description, see SHUM 4931.

BSOC 4161 Microbes and Food: Contemporary Issues Affecting Humanity (also PLPA 4160)

Spring. 4 credits. S. Beer.
For description, see PLPA 4160.

BSOC 4231 Gender and Technology (also FGSS/HIST/STS 4231) (HA-AS)

Spring. 4 credits. S. Pritchard.
For description, see STS 4231.

[BSOC 4291 Politics of Science (also STS 4291, GOVT 4293) (SBA-AS)

Fall. 4 credits. Next offered 2010–2011. R. Herring.]

BSOC 4361 Link, Network, Nexus (also SHUM 4936, STS 4361)

Spring. 4 credits. Limited to 15 students. B. Massumi.
For description, see SHUM 4936.

[BSOC 4421 The Sociology of Science (also SOC 4420, STS 4421) (SBA-AS)

Spring. 4 credits. Next offered 2010–2011. T. Pinch.
For description, see STS 4421.]

BSOC 4471 Seminar in the History of Biology (also BIOEE 4670, HIST 4150, STS 4471) (PBS)

Summer, six-week session, or fall. 4 credits. W. Provine.
For description, see BIOEE 4670.

[BSOC 4711 The Dark Side of Biology: Biological Weapons, Bioterrorism, and Biocriminality (also STS 4711) (SBA-AS)

Fall. 4 credits. Prerequisites: at least one course in STS and one semester of biology beyond introductory biology. Next offered 2010–2011. K. Vogel.

Rapid advances in biotechnology, as well as changing social and political climates, have created new public fears that the malicious release of pathogens and toxins by states and/or terrorist groups is a serious threat. Debates have also emerged as to what biological research and publications should be restricted and censored to prevent misuse. The course explores the scientific, social, political, legal, and ethical discussions surrounding historical and current work on dangerous pathogens and toxins. This course also takes a look at the role that the expert and lay communities play in the shaping of popular perceptions and public policies in these threat discussions.]

BSOC 4921 The History of Reason (also HIST/STS 4921, SHUM 4932)

Spring. 4 credits. Limited to 15 students. P. Dear.
For description, see SHUM 4932.

[BSOC 4961 History of Medicine in China (also ASIAN/HIST/STS 4961)

Spring. 4 credits. Next offered 2011–2012. T. J. Hinrichs.]

BSOC 6610-6611 Environmental Policy (also ALS/BIOEE 6610-6611) (PBS)

Fall and spring (yearlong). Students must enroll in both BSOC 6610 and BSOC 6611. 3 credits each semester. Limited to 12 students. D. Pimentel.
For description and prerequisites, see BIOEE 6610-6611.

COML 4900 Energy, Empire, Modernity (also COML 6900)

Fall. 4 credits. A. Banerjee.
For description, see COML 4900.

COMM 4210 Communication and the Environment

Spring. 3 credits. Offered odd-numbered years. K. McComas.
For description, see COMM 4210.

CSS 4100 Environmental Impacts of Agricultural Biotechnology

Spring. 3 credits. D. Buckley and P. Hobbs.
For description, see CSS 4100.

CSS 4940 Biotechnology and Development (also GOVT 4300)

Spring. 4 credits. R. Herring and J. Thies.
For description see CSS 4940.

DSOC 4380 Population and Development (also DSOC 6380, SOC 2370)

Spring. 3 credits. D. Gurak.
For description, see DSOC 4380.

[HD 3360 Connecting Social, Cognitive, and Emotional Development

Fall. 3 credits. Next offered 2010–2011.
M. Casasola.
For description, see HD 3360.]

HD 3430 Social Worlds of Childhood

Spring. 4 credits. J. Ross-Bernstein.
For description, see HD 3430.

[HD 4140 Social and Psychological Aspects of the Death Penalty

Spring. 3 credits. Next offered 2010–2011.
C. J. Brainerd.
For description, see HD 4140.]

[HD 4180 Aging: Contemporary Issues

Fall. 3 credits. Next offered 2010–2011.
J. Mikels.
For description, see HD 4180.]

[HD 4190 Midlife Development

Fall. 3 credits. Next offered 2010–2011.
A. Ong.
For description, see HD 4190.]

HD 4200 Laboratory in Risk and Traditional Decision-Making

Spring. 3 credits. V. Reyna.
For description, see HD 4200.

HD 4310 Mind, Self, and Emotion: Research Seminar

Spring. 3 credits. Q. Wang.
For description, see HD 4310.

[HD 4320 Cognitive, Social, and Developmental Aspects of Scientific Reasoning (also COGST 4320)

Fall. 3 credits. Next offered 2010–2011.
B. Koslowski.
For description, see HD 4320.]

HD 4590 Transitions Across the Life Span

Fall. 3 credits. C. Loewenheoff.
For description, see HD 4590.

[HD 4640 Adolescent Sexuality (also FGSS 4670)

Fall. 3 credits. Next offered 2010–2011.
R. Savin-Williams.
For description, see HD 4640.]

[HD 4660 Psychobiology of Temperament and Personality

Fall. 3 credits. Next offered 2010–2011.
R. Depue.
For description and prerequisites, see HD 4660.]

HD 4680 Stress in Childhood and Adolescence

Spring. 3 credits. J. Eckenrode.
For description, see HD 4680.

HD 4740 Autism and the Development of Social Cognition

Fall. 3 credits. M. Belmonte.
For description, see HD 4740.

HD 4780 Attention Deficit/Hyperactivity Disorder in Children

Spring. 3 credits. S. Robertson.
For description, see HD 4780.

NS 4600 Explorations in Global Health

Spring. 3 credits. Prerequisite: Global Health minors or permission of instructor.
D. Pelletier.
For description, see NS 4600.

NTRES 4330 Applied Environmental Philosophy

Spring. 4 credits. J. Tantillo.
For description, see NTRES 4330.

[PAM 4570 Innovation and Entrepreneurship in the Health Care Industry

Fall. 3 credits. Next offered 2010–2011.
J. Kuder.
For description see PAM 4570.]

PAM 5520 Health Care Services: Consumer and Ethical Perspectives

Fall. 4 credits. A. Parrot.
For description, see PAM 5520.

[PAM 5560 Managed Care

Fall. 3 credits. For undergraduate seniors only, by permission of instructor. Next offered 2010–2011. J. Kuder.
For description, see PAM 5560.]

[STS 4111 Knowledge, Technology, and Property

Spring. 4 credits. Next offered 2011–2012.
S. Hilgartner.
For description, see STS 4111.]

STS 4221 New York Women (also FGSS 4220) (HA-AS)

Fall. 4 credits. M. Rossiter.
For description, see STS listing, STS 4221.

STS 4311 From Surgery to Simulation

Spring. 4 credits. R. Prentice.
For description, see STS 4311.

STS 4441 Historical Issues of Gender and Science (also FGSS 4440) (CA-AS)

Spring. 4 credits. M. Rossiter.
For description see STS listing, STS 4441.

STS 4531 Knowledge and Society (also SOC 4530) (CA-AS)

Spring. 4 credits. C. Leuenberger.
For description, see STS 4531.

STS 4661 Public Communication of Science and Technology (also COMM 4660/6660, STS 6661)

Spring. 3 credits. Limited to 15 students. Offered even-numbered years.
B. Lewenstein.
For description and prerequisites, see COMM 4660.

STS 4751 Science, Race, and Colonialism (also HIST 4751)

Fall. 4 credits. S. Seth.
For description see STS listing, STS 4751.

STS 4951 Social Studies of the Human Sciences

Fall. 4 credits. C. Leuenberger.
For description, see STS listing, STS 4951.

VI. Other Courses

BSOC 1451 Body, Mind, and Health (also STS 1451) # (CA-AS)

Summer. 3 credits. Open only to junior and senior high school students. M. Hurst.
For description, see STS 1451.

BSOC 3751 Independent Study

Fall or spring. 1–4 credits. Prerequisite: biology and society majors; written permission of faculty supervisor.
Projects under the direction of a Biology and Society faculty member are encouraged as part of the program of study within the student's concentration area. Applications for research projects are accepted by individual faculty members. Students may enroll for 1 to 4 credits in BSOC 3751 Independent Study with written permission of the faculty supervisor and may elect either the letter grade or the S–U option. Students may elect to do an independent study project as an

alternative to, or in advance of, an honors project. Applications and information on faculty research, scholarly activities, and undergraduate opportunities are available in the Biology and Society Office, 306 Rockefeller Hall. *Independent study credits may not be used in completion of the major requirements.*

BSOC 4991/4992 Honors Project I and II (also ALS 4991/4992, HE 4990)

Fall and spring (yearlong). Prerequisite: senior biology and society students by permission of department; overall GPA of 3.3. Students should apply in 306 Rockefeller Hall. Arts and Sciences students should enroll in BSOC 4991 to receive Arts and Sciences credit; CALS students should enroll in ALS 4991 to receive College of Agriculture and Life Sciences credit; HE students should enroll in HE 4990 for College of Human Ecology credit. Students who are admitted to the honors program are required to complete two semesters of honors project research and to write an honors thesis. The project must include substantial research, and the completed work should be of wider scope and greater originality than is normal for an upper-level course. The student must find a project supervisor and a second faculty member willing to serve as faculty reader; at least one of these must be a member of the Biology and Society faculty.

Students must register for the 4 credits each semester for a total of 8 credits. After the fall semester, students receive a letter grade of "R"; a letter grade for both semesters is submitted at the end of the second semester whether or not the student completes a thesis or is recommended for honors. Minimally, an honors thesis outline and bibliography should be completed during the first semester. In consultation with the advisors, the director of undergraduate studies will evaluate whether the student should continue working on an honors project. Students should note that these courses are to be taken in addition to those courses that meet the regular major requirements.

If students do not complete the second semester of the honors project, they must change the first semester to independent study to clear the "R" and receive a grade. Otherwise, the "R" will remain on their record and prevent them from graduating.

BURMESE

See "Department of Asian Studies."

CAMBODIAN (KHMER)

See "Department of Asian Studies."

CATALAN

See "Department of Romance Studies."

CENTER FOR APPLIED MATHEMATICS

The Center for Applied Mathematics administers a broadly based interdepartmental graduate program that provides opportunities

for study and research over a wide range of the mathematical sciences. This program is based on a solid foundation in analysis, algebra, and methods of applied mathematics. The remainder of the graduate student's program is designed by the student and his or her Special Committee. For detailed information on opportunities for graduate study in applied mathematics, students should contact the director of graduate studies of the Center for Applied Mathematics, 657 Frank H. T. Rhodes Hall.

There is no special undergraduate degree program in applied mathematics. Undergraduate students interested in an application-oriented program in mathematics may select an appropriate program in the Department of Mathematics, the Department of Computer Science, or some department of the College of Engineering.

A listing of selected graduate courses in applied mathematics can be found in the description of the center under "Interdisciplinary Centers, Programs, and Studies."

CENTER FOR INTERNATIONAL STUDIES

See "Interdisciplinary Centers, Programs, and Studies."

CHEMISTRY AND CHEMICAL BIOLOGY

B. A. Baird, chair (122 Baker Laboratory, 255-4175); D. B. Collum, associate chair; P. J. Chirik, director of undergraduate studies; H. D. Abuña, B. A. Baird, R. A. Cerione, G. Chan, P. Chen, P. J. Chirik, G. W. Coates, D. B. Collum, B. R. Crane, H. F. Davis, S. DeBeer George, W. R. Dichtel, F. J. DiSalvo, S. E. Ealick, G. S. Ezra, J. H. Freed, B. Ganem, M. A. Hines, R. Hoffmann, S. Lee, H. Lin, D. R. Lorey, J. A. Marohn, J. Njardarson, J. Park, P. Peterson, T. Rutledge, D. Y. Sogah, J. Terry, D. A. Usher, B. Widom, P. T. Wolczanski, D. B. Zax

The Department of Chemistry and Chemical Biology offers a full range of courses in physical, organic, inorganic, analytical, theoretical, bioorganic, and biophysical chemistry. In addition to their teaching interests, chemistry and chemical biology faculty members have active research programs. The link between teaching and research is a vital one in a continuously evolving scientific subject; it ensures that students will be provided with the most advanced information and perspectives and affords opportunities for students to participate in research. For additional information about the department and course offerings, see the department course web page (www.chem.cornell.edu).

The Major

To fit the widely varying needs of our undergraduate majors, the department offers two different tracks that both lead to the same undergraduate degree:

Standard Major—The standard major provides a comprehensive background in all fields of chemistry. Most students who complete the standard major go on to

graduate study in chemistry or to medical school, although some students proceed directly to a position in the chemical industry. With additional independent research (which is not required), the standard chemistry major is fully accredited by the American Chemical Society.

Alternative Major—The alternative major offers a flexible program of study that is primarily designed for students who intend to double major in another field. For example, students majoring in biology can complete the alternative major with little additional class work. This program might also be attractive for students interested in law (especially patent law), as a double major in government or economics plus chemistry is quite feasible. This program is not suited to further graduate work in chemistry. With few exceptions, students in the alternative major are not chosen to participate in the honors program in chemistry. The alternative major is not accredited by the American Chemical Society.

Either version of the major can be completed in three years of study. Most students, however, complete all of the requirements in their first three years with the exception of CHEM 4100, Inorganic Chemistry, which is usually taken in the fall semester of the senior year. The typical chemistry course sequence is:

first year: general chemistry and mathematics

second year: organic chemistry, analytical and organic laboratories, and physics

third year: physical chemistry lectures and laboratories

fourth year: inorganic chemistry

Admission to the Major

Admission to the chemistry major requires the satisfactory completion of a number of introductory courses which, when taken together, demonstrate an ability to complete the major. These courses include (1) CHEM 2150-2160 or 2070-2080 (CHEM 2090 or 1560 may be substituted for 2070 but 1560 is not recommended); (2) CHEM 3000; (3) PHYS 2207 or 1112 or 1116; and (4) MATH 1110 or 1910. Second-semester sophomores (or beyond) who have completed all but one of these requirements may be admitted to the major provided that they have a plan for completing the major on schedule.

The Standard Major

The following courses must be completed for the standard major:

General chemistry: CHEM 2070 + 2080 or CHEM 2150 + 2160. (CHEM 2090 or 1560 may be substituted for CHEM 2070, but 1560 is not recommended).

Organic chemistry: CHEM 3570 + 3580 or CHEM 3590 + 3600

Physical chemistry: CHEM 3890 + 3900

Inorganic chemistry: CHEM 4100

Laboratory chemistry: CHEM 3000 + 3010 + 3020 + 3030

Physics: (PHYS 2207 or 1112 or 1116) + (PHYS 2208 or 2213).

Mathematics: MATH 1110 + 1120 + 2130 or MATH 1110 + 1220 + 2210 + 2220 or MATH 1910 + 1920 + 2930

Most standard majors also perform independent research at some point in their academic career, either during the semester or in the summer. Many students take advanced courses to complement this program.

The Alternative Major

The following courses must be completed for the alternative major:

General chemistry: CHEM 2070 + 2080 or CHEM 2150 + 2160. (CHEM 2090 or 1560 may be substituted for CHEM 2070, but 1560 is not recommended)

Organic chemistry: CHEM 1570 (CHEM 3570 + 3580 or CHEM 3590 + 3600 may be substituted)

Physical chemistry: CHEM 2870 (CHEM 3890 + 3900 may be substituted)

Inorganic chemistry: CHEM 4100

Laboratory chemistry: CHEM 2510 + 2900 + 3000 (CHEM 3010 may be substituted for CHEM 2510; CHEM 3030 may be substituted for CHEM 2900).

Physics: (PHYS 2207 or 1112 or 1116) + (PHYS 2208 or 2213)

Mathematics: MATH 1110 + 1120 or MATH 1110 + 1220 or MATH 1910 + 1920

One additional 3- or 4-credit advanced chemistry course at the 3000 level or above. (CHEM 3580, 3600 or 3900 can be used to satisfy this requirement.)

Three additional courses, of 3 or more credits each, that form a cohesive unit and are not at the introductory level. These three courses must be approved by the director of undergraduate studies.

The three additional courses may be in another field of study, such as biochemistry, physics, biology, materials science, economics, government, or education. Many students who double major use courses from their second major to satisfy this requirement.

Like the standard majors, many alternative majors perform independent research, either in the chemistry department or with a member of the Chemistry field.

Honors

Any student who completes the requirements for a standard major in chemistry with a cumulative GPA of 3.5 or higher shall be awarded a degree with honors (cum laude).

In addition, senior chemistry majors who have superior grades in chemistry and related subjects and who have had good performance in at least 8 credits of undergraduate research (or the equivalent) in chemistry or a related field (e.g., biochemistry) may be nominated for the honors program. To ensure that the nomination process runs smoothly, all students who are interested in the honors program should discuss this possibility with their advisor early in the fall semester of the senior year. Admission to the honors program is by invitation only. Students completing the alternative major are only eligible for the honors program in exceptional cases.

Students in the honors program participate in the honors seminar (CHEM 4980) and write a senior thesis. The successful completion of the honors program leads to the degree of bachelor of arts with honors or high honors in chemistry.

Program for Science Teachers

Chemistry majors who wish to become teachers will be interested to know that Cornell University offers a certification program for teachers of secondary (grades 7–12) science. Interested students apply to the program during their sophomore or junior years. If accepted, students integrate some course work in education with the rest of their undergraduate studies. All chemistry majors who enter this program will remain in the College of Arts and Sciences to complete the major.

After earning the bachelor's degree, certification students enter the graduate field of education to complete a fifth year of study at Cornell. Following this fifth year, students are eligible for a master's degree from Cornell and a teaching certificate from New York State. For additional information, contact the Department of Education, 255-2207.

Laboratory Course Regulations

Students registered for laboratory courses who do not appear at the first meeting of the laboratory will forfeit their place in that laboratory but are not automatically dropped from the course.

Students and members of the teaching staff are required to wear safety goggles and lab aprons in all chemistry laboratories. Closed-toed footwear is required (no sandals). Students are reminded to take their goggles and lab aprons to the first laboratory session. Those who fail to cooperate with the safety program will be asked to leave the laboratories.

Students in organic and analytical labs are required to pay for glassware and any other items broken or missing from their laboratory desks at the close of each semester. Students who fail to inventory their desks at the appointed time in the presence of their instructor are charged a \$20 fee in addition to charges for any breakage.

Courses

Note: Class meeting times are accurate at the time of publication. If changes occur, the department will provide new information as soon as possible.

Preliminary examinations for all courses may be given in the evening.

Courses with Overlapping Content

Because the department offers several courses with overlapping content, students should select courses carefully to meet the needs of their academic programs and to ensure credit for each course they take. Listed below are groups of courses with largely similar content. In general, students may receive credit for only one course in each group.

CHEM 1560, 2070, 2090, 2160

CHEM 2080, 2150

CHEM 1570, 3570

CHEM 1007 Academic Support for CHEM 2070

Fall, spring. 1 transcript credit only; cannot be used toward graduation.

CHEM 1007 reviews material presented in CHEM 2070 lectures and also provides problem-solving strategies and practice. This course is recommended for students who want to improve their chemistry problem-solving

skills. CHEM 1007 is not a substitute for CHEM 2070 lectures and recitations.

CHEM 1008 Academic Support for CHEM 2080

Fall, spring. 1 transcript credit only; cannot be used toward graduation.

CHEM 1008 reviews material presented in CHEM 2080 lectures and also provides problem-solving strategies and practice. This course is recommended for students who want to improve their chemistry problem-solving skills. CHEM 1008 is not a substitute for CHEM 2080 lectures and recitations.

CHEM 1057 Academic Support for CHEM 3570

Fall, spring. 1 transcript credit only; cannot be used toward graduation.

Reviews material presented in CHEM 3570 lectures and offers practice with CHEM 3570 material. Weekly review sessions focus on the most important topics covered in lecture, and office hours held throughout the week are designed to help improve performance in CHEM 3570.

CHEM 1058 Academic Support for CHEM 3580

Fall, spring. 1 transcript credit only; cannot be used toward graduation.

Reviews material presented in CHEM 3580 lectures and offers practice with CHEM 3580 material. Weekly review sessions focus on the most important topics covered in lecture and office hours held throughout the week are designed to help improve performance in CHEM 3580.

CHEM 1150 The Language of Chemistry (PBS)

Fall. 3 credits. Contributes to satisfying CALS physical science requirement of one course in chemistry. S–U or letter grades.

Lec, M W F. T. Rutledge.

Adam Sandler once said, "Chemistry can be a good and a bad thing. Chemistry is good when you make love with it. Chemistry is bad when you make crack with it." Using this sophisticated view of chemistry as a perhaps widely held perception and as a focus, a thorough examination of the good and the bad that chemistry has accomplished will be examined.

[CHEM 1160 The World of Chemistry (PBS)

Spring. 3 credits. Contributes to satisfying CALS physical science requirement of one course in chemistry. S–U or letter grades.

Lec, M W F. Next offered 2010–2011.

Students in *The World of Chemistry* will explore the stresses we have placed on our ecosystem—and atmosphere—and learn how chemistry allows us to understand these problems and to repair them.]

CHEM 1560 Introduction to General Chemistry (PBS)

Fall or summer. 4 credits. Limited enrollment. Nonrefundable lab fee (covers cost of safety goggles, lab apron, and breakage): \$20. Lec, M W F; lab, M, T, W, R, or F; prelims, Oct. 1, Nov. 12. S. Lee.

A one-semester introduction to chemistry, both qualitative and quantitative. CHEM 1560 prepares students for CHEM 1570; CHEM 1560 is not recommended for premedical or pre-veterinary students; however, students who have never taken a chemistry course in secondary school or who have a very weak preparation sometimes take CHEM 1560 + 2080.

CHEM 1570 Introduction to Organic and Biological Chemistry (PBS)

Spring or summer. 3 credits. Prerequisite: CHEM 1560 or 2070. Because CHEM 1570 is only a 3-credit course, it does not provide a practical route to satisfying medical school requirements. Because of duplication of materials, students who take both 1570 and 3570 will receive graduation credit only for CHEM 1570. Lec, M W F; prelims, Feb. 18, Mar. 16, Apr. 13. W. Dichtel.

Introduction to organic chemistry with an emphasis on those structures and reactions of organic compounds having particular relevance to biological chemistry.

CHEM 2070–2080 General Chemistry (PBS)

2070, fall or summer; 2080, spring or summer. 4 credits each semester. CHEM 2070 (or CHEM 2090) is a prerequisite for CHEM 2080. (CHEM 1560 is accepted, but not recommended.) CHEM 2070 has a \$20 nonrefundable lab fee that covers cost of safety goggles, lab apron, and breakage. Engineering students should take CHEM 2090 and cannot take CHEM 2070 without written permission from the Chemistry Office of Undergraduate Studies and the College of Engineering. Exceptionally well prepared students may receive credit for CHEM 2070 by demonstrating competence in the advanced placement examination of the College Entrance Examination Board or in the departmental examination given at Cornell before classes start in the fall. Taking CHEM 2080 after 2150 may be done only by permission of the Director of Undergraduate Studies. Lec, T R; lab, M T W R F; discs, T W R F; prelims, Oct. 6, Nov. 12, Mar. 2, Apr. 13. Fall; F. J. DiSalvo and D. B. Zax; spring, D. A. Usher.

Covers fundamental chemical principles, with considerable attention given to the quantitative aspects and techniques important for further work in chemistry.

CHEM 2090 Engineering General Chemistry

Fall or spring. 4 credits. Enrollment limited to Engineering students; students from other colleges cannot take CHEM 2090 without written permission from the Chemistry Office of Undergraduate Studies. Prerequisite: high school chemistry or permission of instructor. CHEM 2090 is required of all Engineering freshmen and is a prerequisite for CHEM 2080. Entering students exceptionally well prepared in chemistry may receive advanced placement credit for General Chemistry by demonstrating competence in the advanced placement examination of the College Entrance Examination Board or in the departmental examination given at Cornell before classes start in the fall. Nonrefundable lab fee (covers cost of safety goggles, lab apron, and breakage): \$20. Lec, M W F; lab, M T W R F; prelims, Oct. 6, Nov. 12, Mar. 2, Apr. 13. Fall: P. Chen; spring: P. T. Wolczanski.

Covers basic chemical concepts, such as reactivity and bonding of molecules, intermolecular forces in liquids and solids, gases, chemical equilibrium, thermodynamics, introductory quantum mechanics, and kinetics. Attention will be focused on aspects of chemistry most pertinent to engineering.

CHEM 2150-2160 Honors General and Inorganic Chemistry (PBS)

2150, fall; 2160, spring. 4 credits each semester. Limited enrollment. Prerequisites: two years high school chemistry or permission of instructor, physics, and mathematics. Corequisite: calculus course at level of MATH 1110 or 1910 for students who have not taken high school calculus; for CHEM 2160, CHEM 2150.

Recommended for students who intend to specialize in chemistry or in related fields. Taking CHEM 2080 after CHEM 2150 may be done only by permission of director of undergraduate studies. Nonrefundable lab fee (covers cost of safety goggles, lab apron, and breakage): \$20. Lec, M W F; lab, M T W R or F; prelims, Oct. 8, Nov. 12, Mar. 2, Apr. 8. Fall: H. F. Davis; spring: S. Lee.

Intensive systematic study of the laws and concepts of chemistry, with considerable emphasis on quantitative aspects. First semester covers thermochemistry, kinetics, and equilibrium. Second semester includes systematics of inorganic chemistry. Laboratory work covers qualitative and quantitative analysis, transition metal chemistry, and spectroscopic techniques.

CHEM 2510 Introduction to Experimental Organic Chemistry

Fall, spring, or summer. 2 credits. Limited enrollment. Corequisite: CHEM 1570 or 3570. Not recommended for chemistry majors considering graduate school in chemistry. Lec, fall, R or F; spring, R; lab, M T W R or F; prelims, fall: Nov. 17; spring: Apr. 15. T. Rutledge.

Introduction to the synthesis, separation, characterization, and handling of materials, including the applications of different types of chromatography, extraction, crystallization, infrared spectroscopy, polarimetry, and others.

CHEM 2870-2880 Introductory Physical Chemistry (PBS)

2870, fall; 2880, spring. 3 credits each semester. Prerequisites: CHEM 2080 or 2160 and MATH 1110-1120 and PHYS 2208, or permission of instructor; for CHEM 2880, CHEM 2870 or 3890. Lec, M W F; prelims: 2870: Oct. 8, Nov. 24. 2880: Mar. 11, Apr. 20. Fall: R. F. Loring; spring: H. F. Davis.

Survey of the fundamental principles of physical chemistry, focusing in the fall on thermodynamics, chemical kinetics, and the electronic structure of atoms and molecules. In the spring, the course is oriented to the application of physical chemistry to biological systems, including statistical mechanics, phenomena in condensed phases, transport, electrochemistry, and spectroscopy. CHEM 2870 satisfies the minimum requirement for physical chemistry in the alternative chemistry major.

CHEM 2900 Introductory Physical Chemistry Laboratory

Spring. 2 credits each semester. Lec, T R; lab: M T R F. J. A. Marohn.

Survey of the methods basic to the experimental study of physical chemistry, with a focus on the areas of kinetics, equilibrium, calorimetry, and molecular spectroscopy.

CHEM 3000 Quantitative Chemistry

Fall. 2 credits. Prerequisite: CHEM 2080 or 2160 or advanced placement in chemistry.

Lec, R; lab, M T W R. J. A. Marohn.

Volumetric, spectrophotometric, and potentiometric methods are emphasized. Techniques are learned by analysis of knowns, and then are used on unknowns. Lectures and problem sets stress the relationship between theory and applications.

CHEM 3010 Honors Experimental Chemistry I (PBS)

Spring. 4 credits. Prerequisites: CHEM 3000 and 3570 or 3590. Lec, M W F; 2 labs, M W or T R. T. Rutledge.

Introduction to the techniques of synthetic organic chemistry. A representative selection of the most important classes of organic reactions is explored in the first half of the semester, augmented by lectures on the reaction chemistry and the theory of separation and characterization techniques.

CHEM 3020 Honors Experimental Chemistry II (PBS)

Fall. 4 credits. Limited enrollment; priority given to chemistry majors. Prerequisite: CHEM 3010. Lec, M W F; 2 labs, M W T R. F. H. D. Abruña.

Instrumental methods of analysis, including chemical microscopy, visible and infrared spectroscopies, and gas chromatography.

CHEM 3030 Honors Experimental Chemistry III (PBS)

Spring. 4 credits. Limited to 10 students per lab. Prerequisites: CHEM 3020, 3890, 3900; co-registration in latter permissible. Lec, M W F; 2 labs, M W or T R. D. B. Zax.

Introduction to experimental physical chemistry, including topics in spectroscopy and kinetics. The analysis and numerical simulation of experimental data is stressed.

CHEM 3570-3580 Organic Chemistry for the Life Sciences (PBS)

Fall or summer, 3570; spring or summer, 3580. 3 credits each semester. Prerequisite: for CHEM 3570, CHEM 2080 or 2160 or advanced placement; for CHEM 3580, CHEM 3570 or permission of instructor. Recommended: concurrent registration in CHEM 2510 or 3000. Because of duplication of material, students who take both CHEM 1570 and 3570 will receive graduation credit only for CHEM 1570. Lec, M W F, optional disc may be offered; prelims, Sept. 24, Oct. 20, Nov. 12, Feb. 18, Mar. 16, Apr. 22. Fall: J. Njardarson; spring: D. Y. Sogah.

Study of the more important classes of carbon compounds—including those encountered in the biological sciences. Emphasizes their three-dimensional structures, mechanisms of their characteristic reactions, their synthesis, methods of identifying them, and their role in modern science and technology.

CHEM 3590-3600 Honors Organic Chemistry I and II (PBS)

3590, fall; 3600, spring. 4 credits each semester. Limited enrollment. Prerequisites: CHEM 2080 or CHEM 2160 or permission of instructor. Recommended: co-registration in CHEM 3000-3010-3020. Recommended for students who intend to specialize in chemistry or closely related fields. Lec, M W F; disc, W; prelims, Sept. 24, Oct. 27, Nov. 12, Spring: Feb. 18, Mar. 16, Apr. 22. Fall: B. Ganem; spring, H. Lin.

Rigorous and systematic study of organic compounds, their structures, the mechanisms

of their reactions, and the ways they are synthesized in nature and in the laboratory.

CHEM 3890-3900 Honors Physical Chemistry I and II (PBS)

Fall, 3890; spring, 3900. 4 credits each semester. Prerequisites: MATH 2130 or 2210-2220; PHYS 2208; CHEM 2080 or 2160 or permission of instructor; for CHEM 3900, CHEM 3890. Lec, 3890: M W F; rec, M, T, or W. Lec, 3900: M W F; rec M W R; prelims: 3890, Sept. 29, Oct. 27, Nov. 24; 3900, Feb. 18, Mar. 16, Apr. 15. Fall, 3890: G. S. Ezra; spring, 3900: J. Park.

CHEM 3890 is primarily an introduction to the quantum mechanics of atoms and molecules. The behavior of ensembles of quantum mechanical particles (statistical mechanics) is introduced near the end of the semester. Rotational, vibrational and electronic spectroscopy are covered in detail. CHEM 3900 is a continuation of CHEM 3890 and discusses the thermodynamic behavior of macroscopic systems in the context of quantum and statistical mechanics. Kinetic theory and the laws of thermodynamics are covered in detail.

[CHEM 4040 Entrepreneurship in Chemical Enterprise

Spring. 1 credit. Lec, T. Next offered 2010-2011. B. Ganem.

Designed to acquaint students with the problems of planning, starting, and managing a new scientifically oriented business venture, the course consists of six weekly 90-minute meetings focusing on case studies and assigned reading, as well as outside lectures by entrepreneurs in the chemical, pharmaceutical, and biotechnology industries. Topics include new technology evaluation and assessment, business formation, resource allocation, management development, as well as manufacturing and sales issues.]

CHEM 4100 Inorganic Chemistry (PBS)

Fall. 4 credits. Prerequisites: CHEM 3580 or 3600, and 2870 or 3900. Lec, M W F; prelims, Sept. 24, Oct. 20, Nov. 12. S. DeBeer George.

Systematic study of the synthesis, structure, bonding, reactivity, and uses of inorganic, organometallic, and solid-state compounds.

CHEM 4210 Introduction to Inorganic Chemistry Research

Fall or spring. 2-4 credits. Prerequisites: CHEM 3030 and 3890-3900, or 2870-2880, and 2900 with average of B- or better, or permission of instructor. Selected faculty. Research in inorganic chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 4330 Introduction to Analytical Chemistry Research

Fall or spring. 2-4 credits. Prerequisites: CHEM 3030 and 3900 with average of B- or better or permission of instructor. Selected faculty.

Research in analytical chemistry involving both laboratory and library work, planned in consultation with a faculty member.

[CHEM 4400 Bio-Inorganic Chemistry (PBS)

Spring. 3 credits. Prerequisites: CHEM 2150-2160 or 2070-2080, 3570-3580, 3590-3600 or equivalent. Lec, W F. Next offered 2010-2011. B. R. Crane.

Addresses important aspects of inorganic chemistry in biological systems. Topics include: (1) the distribution and properties of

metals in biology; (2) coordination chemistry of biological metals; (3) properties of metal-containing macromolecules; (4) redox processes and long-range electron transfer; (5) metallocofactors and metal clusters; (6) Lewis acid catalysis; (7) metal-oxygen reactions in biology; and (8) metal trafficking and metalloprotein assembly.]

CHEM 4500 Principles of Chemical Biology (also BIOBM 4500) (I) (PBS)

Fall. 3 credits. Prerequisites: CHEM 3570–3580, 3590–3600 or equivalent. Lec, T R. H. Lin.

Covers topics at the interface of chemistry and biology with a focus on problems where organic chemistry has made a particularly strong contribution to understanding the mechanism of the biological system. Topics include the organic chemistry of carbohydrates, proteins and nucleic acids, strategies for identifying the cellular target of physiologically active natural products, combinatorial chemistry, and chemical aspects of signal transduction, cell division and development.

[CHEM 4510 Structural Chemical Biology (PBS)]

Spring. 3 credits. Prerequisites: CHEM 2880 and 3580 or equivalent. Lec, T; lab, R. Next offered 2010–2011. S. Ealick.

This course is intended for students with a basic understanding of chemistry who want more knowledge about chemical biology. The interrelationship between the structure and function of biologically important molecules will be explored.]

CHEM 4610 Introduction to Organic Chemistry Research

Fall or spring. 2–4 credits. Prerequisites: CHEM 3020 and 3580 or 3600 with grade of B– or better or permission of instructor. Selected faculty.

Research in organic chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 4770 Introduction to Physical Chemistry Research

Fall or spring. 2–4 credits. Prerequisite: CHEM 3900 with average of B– or better or permission of instructor. Selected faculty.

Research in physical chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 4980 Honors Seminar

Spring. 0 credits. Admission only by department invitation. Additional pre- or corequisites: outstanding performance in two coherent 4-credit units of research in course such as CHEM 4210, 4330, 4610, 4770; or equivalent amount of research in another context. Lec W. G. W. Coates and F. J. DiSalvo.

In the Chemistry Honors Seminar students will present their research in written and oral form. The Seminar will also include a broader discussion of professional issues and life skills in the world of chemistry.

CHEM 6000–6010 General Chemistry Colloquium

6000, fall; 6010, spring. 0 credits. R. Staff. Series of talks representative of all fields of current research interest in chemistry given by distinguished visitors and faculty members.

CHEM 6020 Information Literacy for the Physical Scientist

Spring. 1 credit. Primarily for graduate students and undergraduate chemistry majors doing research. Lec, T. L. Solla.

Introduction to physical science information research methods, with hands-on exploration of print and electronic resources. Much important information can be missed and valuable time wasted without efficient information research strategies. Topics include finding chemical and physical properties, reaction and analytical information; patents, web resources; using specialized resources in chemistry, physics, biochemistry, and materials science; and managing citations.

CHEM 6050 Advanced Inorganic Chemistry I: Symmetry, Structure, and Reactivity

Fall. 4 credits. Prerequisite: CHEM 3890–3900 or equivalent or permission of instructor. Lec, M W F. P. Wolczanski.

Introduction to chemical bonding and applications of group theory, including valence bond theory, and spectroscopy as applied to main group and transition-metal coordination compounds. An introduction to reactivity covers substitution, electron transfer, and related reactions. Readings are at the level of Carter's *Molecular Symmetry and Group Theory* and Jordan's *Reaction Mechanisms of Inorganic and Organometallic Systems*.

[CHEM 6060 Advanced Inorganic Chemistry II: Synthesis, Structure, and Reactivity of Coordination Compounds, and Bioinorganic Chemistry]

Spring. 4 credits. Prerequisite: CHEM 6050 or equivalent or permission of instructor. Lec, M W F. Next offered 2010–2011. P. T. Wolczanski.

Synthesis, structure, and reactivity of main group and modern coordination compounds and bioinorganic systems. The mechanisms of transition-metal reactions are emphasized, and evaluation of the current literature are stressed.]

[CHEM 6070 Advanced Inorganic Chemistry III: Solid-State Chemistry]

Spring. 4 credits. Prerequisite: undergraduate inorganic chemistry or permission of instructor. Lec, M W F. Next offered 2010–2011. S. Lee.

Third in a three-semester sequence. Interdisciplinary approach to solids. Topics include solid-state structure and X-ray diffraction, phase diagrams, diffusion kinetics, synthetic methods, electronic structure, and physical properties of solids.]

CHEM 6080 Advanced Inorganic Chemistry I: Organometallic Chemistry

Spring. 4 credits. Prerequisites: CHEM 6050, 6650, or permission of instructor. M W F. P. J. Chirik.

Synthesis, structure, and reactivity of organometallic compounds and applications in catalysis. Evaluation of the current literature is emphasized, and background readings are at the level of *Applications of Organotransition Metal Chemistry* by Collman, Hegedus, Finke, and Norton and *Organometallic Chemistry of the Transition Metals* by Crabtree.

[CHEM 6250 Advanced Analytical Chemistry I]

Spring. 4 credits. Prerequisite: CHEM 2880 or 3890 or equivalent. Lec, M W F; occasional labs, TBA. W. Next offered 2010–2011. D. B. Zax.

Application of high-resolution NMR spectroscopy, infrared, and mass spectroscopy to chemical problems. Some practical experience in NMR and MS is offered.]

[CHEM 6270 Advanced Analytical Chemistry II]

Spring. 3 credits. Primarily for graduate students. Prerequisite: CHEM 7930 or equivalent preferable. Lec, M W F. Next offered 2010–2011. D. B. Zax.

Modern techniques in nuclear magnetic resonance. Little overlap is expected with CHEM 6250, as this course focuses on more general questions of experimental design, understanding of multipulse experiments, and aspects of coherent averaging theory.]

[CHEM 6280 Trace Element and Isotopic Analysis (also NS 6900)]

Fall. 3 credits. Primarily for graduate students and advanced undergraduates. Prerequisite: CHEM 2880 or 3900 or 3020, or CHEM 2080 and PHYS 2208, or permission of instructor. Lec, T R. Offered alternate years; next offered 2010–2011. J. T. Brenna.

Survey course in modern high-precision isotope ratio mass spectrometry (IRMS) techniques and trace/surface methods of analysis.]

CHEM 6290 Electrochemistry

Spring. 4 credits. Primarily for graduate students and junior and senior undergraduates. Prerequisite: CHEM 3900 or equivalent. Recommended: MATH 2130. Lec, T R. H. D. Abruña.

Fundamentals and applications of electrochemistry. Topics include the fundamentals of electrode kinetics, electron transfer theory, the electrical double layer, diffusion, and other modes of transport. A broad range of electrochemical techniques and instrumentation will also be covered.

CHEM 6500–6510 Organic and Organometallic Chemistry Seminar

6500, fall; 6510, spring. 0 credits. Requirement for graduate students majoring in organic or bioorganic chemistry. Juniors and seniors encouraged to attend. T R. Staff.

Series of talks representative of all fields of current research interest in organic organometallic chemistry, given by research associates, faculty members, and distinguished visitors.

CHEM 6650 Advanced Organic Chemistry

Fall. 4 credits. Primarily for graduate students and junior and senior undergraduates. Prerequisites: CHEM 3580 or 3600, and CHEM 3900 or equivalents, or permission of instructor; some knowledge of elementary quantum mechanics. Lec, M W F. W. R. Dichtel.

Discussion of the properties of organic molecules, reactive intermediates, and the underlying physical phenomena that affect them.

CHEM 6660 Synthetic Organic Chemistry

Spring. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisite: CHEM 6650 or permission of instructor. Lec, T R. D. B. Collum.

Modern techniques of organic synthesis; applications of organic reaction mechanisms and retrosynthetic analysis to the problems encountered in rational multistep synthesis, with particular emphasis on modern developments in synthesis design.

[CHEM 6670 Topics in Chemical Biology]

Fall. 4 credits. Prerequisite: CHEM 3600 or equivalent, BIOBM 3300 or permission of instructor. Lec, M W F. Next offered 2010–2011. H. Lin.

This course is intended for advanced undergraduate students majoring in chemical biology and graduate students working in related areas. The topics that will be covered fall into two general areas: Antibiotics: Mechanism of action of different types of antibiotics; Biosynthesis of polyketide and nonribosomal peptide antibiotics; Antibiotic resistance mechanisms and strategies to overcome antibiotic resistance.]

[CHEM 6680 Chemical Aspects of Biological Processes]

Fall. 4 credits. Prerequisite: CHEM 3600 or equivalent. Lec, T R. Next offered 2010–2011. T. P. Begley.

Examines a representative selection of the most important classes of enzyme-catalyzed reactions from a mechanistic perspective. Topics include the chemical basis of enzymatic catalysis, techniques for the elucidation of enzyme mechanism, cofactor chemistry, and the biosynthesis of selected natural products. The application of chemical principles to understanding biological processes is emphasized.]

[CHEM 6690 Organic and Polymer Synthesis Using Transition Metal Catalysts]

Spring. 4 credits. Prerequisite: primarily for graduate students or advanced undergraduates; CHEM 3590/3600 or equivalent or permission of instructor. Next offered 2010–2011. G. W. Coates.

Transition metal-based catalysts are invaluable in both organic and polymer synthesis. This course begins with a brief overview of organometallic chemistry and catalysis.]

[CHEM 6700 Fundamental Principles of Polymer Chemistry]

Fall. 4 credits. Prerequisite: CHEM 3590/3600 or equivalent or permission of instructor. Primarily for graduate students and advanced undergraduates. No previous knowledge of polymers required. Lec, T R. G. W. Coates.

Emphasizes general concepts and fundamental principles of polymer chemistry. The first part of the course deals with general introduction to classes of polymers, molar masses and their distributions, and a brief survey of major methods of polymer synthesis. The second part deals with characterization and physical properties. These include solution properties—solubility and solubility parameters, solution viscosity, molecular weight characterizations (gel permeation chromatography, viscometry, light scattering, osmometry); bulk properties—thermal and mechanical properties; dynamic mechanical properties; and structure-property relationships.

[CHEM 6710 Synthetic Polymer Chemistry (also CHEM 6750, MSE 6710)]

Spring. 4 credits. Prerequisites: minimum of organic chemistry at level of CHEM 3590/3600. Students without this organic chemistry background should see instructor before registering. Primarily for graduate students and advanced undergraduates. Recommended: knowledge of material covered in CHEM 6700 or MSE 6220. Lec, T R. Next offered 2010–2011. D. Y. Sogah.

Emphasizes application of organic synthetic methods to the development of polymerization methods and control of polymer architecture. Emphasizes modern concepts in synthetic polymer chemistry and topics of current interest: the study of new methods of polymer synthesis, the control of polymer stereochemistry and topology, and the design of polymers tailored for specific uses and properties.]

[CHEM 6720 Kinetics and Regulation of Enzyme Systems]

Spring. 4 credits. Primarily for graduate students with interests in biophysical chemistry and quantitative treatments of protein function. Prerequisite: CHEM 2880 or 3900, BIOBM 3300, 3310, or equivalents or permission of instructor. Lec, M W F. Next offered 2010–2011. B. Baird.

Focus is on protein interactions and related changes in structure and activity. Topics include protein structure and dynamics; thermodynamics and kinetics of ligand binding; steady state and transient enzyme kinetics; enzyme catalysis and regulation; and the role of cell membrane receptors in regulating cellular activities.]

[CHEM 6770 Chemistry of Nucleic Acids]

Fall. 4 credits. Primarily for graduate students. Prerequisites: CHEM 3580 or 3600, and 3900 or equivalents. Lec, M W. Next offered 2010–2011. D. A. Usher.

Structure, properties, synthesis, and reactions of nucleic acids from a chemical point of view. Special topics include RNAi, antisense and antigene technology, ribozyme reactions (including the ribosome), mutagens, PCR, recent advances in sequencing, DNA as a computer, and alternative genetic materials.]

[CHEM 6810 Introduction to Quantum Chemistry]

Fall. 4 credits. Prerequisites: one year of undergraduate physical chemistry, three semesters of calculus, one year of college physics. Lec T R. Next offered 2010–2011. G. S. Ezra.

Introduction to the application of quantum mechanics in chemistry. Covers many of the topics in CHEM 7930–7940 at a more descriptive, less mathematical level.]

[CHEM 6860 Physical Chemistry of Proteins]

Fall. 4 credits. Primarily for graduate students. Prerequisite: CHEM 2880 or 3900 or equivalents. Letter grades for undergraduate and graduates. Lec, M W F. B. R. Crane.

Protein studies using physical methods are presented, with focuses on using single molecule spectroscopic methods and on metalloprotein structures/functions. Topics include: (1) physical concepts: chemical structure and conformation of proteins; protein folding energy landscape; electron transfer theory; enzyme kinetics; protein-

protein interactions; protein–DNA interactions. (2) Experimental methodologies: absorption/emission spectroscopy; fluorescence resonance energy transfer; confocal microscopy; total internal reflection microscopy; single molecule spectroscopy; time correlated single photon counting; fluorescence correlation spectroscopy; atomic force microscopy; optical/magnetic tweezers; super resolution optical microscopy; (3) Protein structure and function: oxygen binding and activation proteins; electron transfer proteins; oxygenases and oxidases; metallochaperones; metalloregulatory proteins; green fluorescent proteins; motor proteins (kinesin, dynein and F1-ATPase); and live cell imaging.

[CHEM 7000 Baker Lectures]

Fall and spring. Next offered 2010–2011. Distinguished scientists who have made significant contributions to chemistry will come to Cornell for one-day symposiums. Refer to the Chemistry and Chemical Biology web site for more information, www.chem.cornell.edu.]

[CHEM 7010 Introductory Graduate Seminar]

Fall. 0 credits. Highly recommended for all senior graduate students in any field of chemistry. Lec, W. Next offered 2010–2011. R. Hoffmann.

Discussion of professional issues facing young chemists as well as life skills: academic and industrial trends, presentations, employment, immigration, publication, research funding, and ethics.]

[CHEM 7160 Introduction to Solid State Organic Chemistry]

Spring. 3 credits. Recommended: CHEM 6070 or some exposure to or course in solid state chemistry and quantum mechanics; good undergraduate physical chemistry course may be sufficient for quantum theory; PHYS 4443 or CHEM 7930 or 7940 are at substantially higher level than what is needed. Lec, M W F. Next offered 2010–2011. S. Lee.

Examines some principles of crystallography and also electronic structure theory of solids. We then consider properties such as conduction, superconductivity, ferroelectricity and ferromagnetism. The final portion of this course is concerned with structure-property relations.]

[CHEM 7650 Physical Organic Chemistry I]

Fall. 4 credits. Primarily for graduate students. Lec, M W F. C. F. Wilcox.

Explores contemporary tools for calculating molecular structures and energies of species of all sizes. The course uses computers extensively but requires only a limited knowledge of mathematics.)

[CHEM 7740 Chemistry of Natural Products: Combinatorial Chemistry]

Spring. 3 credits. Prerequisites: CHEM 3600 and BIOBM 3300 or equivalent. Lec, M W F. Next offered 2010–2011. T. P. Begley.

This course explores the design, synthesis, screening, and use of natural (i.e., peptide, protein, nucleic acid, carbohydrate) and unnatural (i.e., totally synthetic) libraries.]

[CHEM 7800 Chemical Kinetics and Molecular Reaction Dynamics]

Fall. 4 credits. Prerequisite: CHEM 6810 or permission of instructor. Lec, T R. Next offered 2010–2011. Staff.

Principles and theories of chemical kinetics and molecular reaction dynamics. Topics include potential energy surfaces, transition state theory, and statistical theories of unimolecular decomposition. Depending on class interest, the course also includes special topics such as surface reactions and photochemistry.]

CHEM 7870 Mathematical Methods of Physical Chemistry

Fall. 4 credits. Prerequisites: one year of undergraduate physical chemistry, three semesters of calculus, and one year of college physics. Lec, T R. J. Park.

Provides the mathematical foundation for graduate courses in physical chemistry, such as quantum mechanics and statistical mechanics, as well as for research in experimental and theoretical physical chemistry. Topics include linear algebra, matrices, and the eigenvalue problem; functions of a complex variable and contour integration; methods of solution of relevant differential equations; special functions; partial differential equations; integral transforms. The program Mathematica is employed throughout for both analytical and numerical work. At the level of *Mathematical Methods for Scientists and Engineers* by McQuarrie, and *Mathematical Methods for Physicists* by Arfken and Weber.

CHEM 7880 Macromolecular Crystallography (also BIOBM 7380)

Fall. 3 credits. Prerequisite: permission of instructor. Lec, T R. S. E. Ealick.

Lectures cover the fundamentals of X-ray crystallography and focus on methods for determining the three-dimensional structures of macromolecules. Topics include crystallization, data collection, phasing methods, model building, refinement, structure validation, and structure interpretation.

CHEM 7890-7900 Introduction to Nanoscale Materials Research

7890, fall; 7900, spring. 3 credits each semester. Primarily for graduate students. Lec, T R. M. A. Hines.

A broad introduction to the scientific and technical challenges and techniques that underlie nanoscale materials research, including some of the skills necessary for a successful career in science or engineering (e.g., public speaking, research ethics). The course is composed of a rotating series of short modules presented in a variety of formats, including lectures, workshops, laboratory experiments and seminars. Students will receive training in both experimental and computational techniques. Enrolled students must complete all modules.

CHEM 7910 Spectroscopy

Spring. 4 credits. Prerequisite: CHEM 7930 or PHYS 4443 or equivalent. Lec, T R. J. H. Freed.

Magnetic Resonance Spectroscopy and Molecular Spectroscopy are offered alternate years. Molecular Spectroscopy (offered Spring 2010) includes principles of molecular rotational, vibrational, and electronic spectroscopy; interaction of molecules with radiation; Born-Oppenheimer approximation, diatomic molecules, polyatomic molecules, molecular symmetry groups. At the level of *Molecular Rotation Spectra* by Kroto. Magnetic Resonance Spectroscopy includes: quantum mechanics of electron and nuclear spins; Fourier Transform and Two Dimensional experiments; spin relaxation; multiple quantum coherence; imaging. At the level of *The Principles of Magnetic Resonance* by Slichter.

[CHEM 7920 Molecular Collision Theory

Spring. 4 credits. Lec, T R. Next offered 2010-2011. G. S. Ezra.

The concepts and methods of scattering theory are described with particular emphasis on applications to problems of chemical interest. At the level of Child's *Molecular Collision Theory* and Taylor's *Scattering Theory*.]

CHEM 7930 Quantum Mechanics I

Fall. 4 credits. Prerequisites: CHEM 3900, co-registration in AEP 3210, or CHEM 7870 or equivalents or permission of instructor. Lec, M W F. G. Chan.

Basic quantum mechanics at the level of Landau and Lifschitz: time-independent and time-dependent Schrodinger's equation, matrix, operators, and bracket formalisms, orbital and spin angular momentum, one-dimensional examples, tunnelling, hydrogen atom, many-electron wavefunctions and particle statistics, time-independent and time-dependent perturbation theory, variational principle, scattering theory.

CHEM 7940 Quantum Mechanics II

Spring. 4 credits. Prerequisites: CHEM 7930 or equivalent and CHEM 7870 or equivalent or co-registration in AEP 3220, or permission of instructor. Lec, M W F. G. S. Ezra.

Topics include the density matrix; evolution operator; path integral formulation of quantum mechanics; time-dependent phenomena; two-level system; time-dependent perturbation theory; Fermi's Golden rule; interaction of radiation with matter; second quantization, stimulated and spontaneous emission; correlation functions and response theory; electric and magnetic properties of molecules; scattering theory; theory of reaction rates; molecular spectroscopy.

CHEM 7950 Statistical Thermodynamics

Fall. 4 credits. Primarily for graduate students. Prerequisite: CHEM 3900 or equivalent. Pre or corequisite: CHEM 6810 or CHEM 7930 or equivalent. Lec T R. J. H. Freed.

CHEM 7960 Statistical Mechanics

Spring. 4 credits. Prerequisites: CHEM 7950, CHEM 7930 or CHEM 7110 or equivalent. Lec, T R. R. F. Loring.

Statistical mechanics of interacting atoms and molecules. Topics include liquid state theory, critical phenomena, computational statistical mechanics, and nonequilibrium statistical mechanics. Statistical thermodynamics at the level of the first 12 chapters of *Statistical Mechanics* by McQuarrie. Topics include ensembles and thermodynamics: microscopic states vs. macroscopic observables, maximum entropy, partition functions and calculation of thermodynamic properties; systems of noninteracting particles: Boltzmann distribution, ideal gases, ideal crystals, thermodynamics from spectroscopic data, chemical equilibrium, Bose-Einstein and Fermi-Dirac statistics; weak interacting systems: Dense gases and simple fluids.

CHEM 7980 Electronic Structure Theory

Spring. 4 credits. Prerequisites: CHEM 7930 or equivalent. Lec, T R. G. K. Chan.

Quantum mechanics of many-particle systems as found in quantum chemistry and condensed matter. The emphasis will be on methods and techniques, although examples will be drawn both from molecular systems and condensed matter models. Most systems will be considered at zero temperature.

CHINA AND ASIA-PACIFIC STUDIES

X. Xu, acting director (123 McGraw Hall, 255-4741), R. Bush, A. Carlson, J. Chen, Z. Chen, S. Cochran, S. Divo, E. Gunn, P. Katzenstein, F. Logevall, T. Lowi, A. Mertha. Affiliated faculty: M. Evangelista, J. Kirshner, J. V. Koschmann, T. Lyons, V. Nee, E. Sanders, M. Shin, E. Tagliacozzo, K. Taylor, X. Xu.

China and Asia-Pacific Studies (CAPS) offers a unique approach to the study of China's language, history, politics, society, and foreign relations by providing students with experience both on- and off-campus, including three years in Ithaca, one semester in Washington, D.C., and one semester in Beijing. web site: www.einaudi.cornell.edu/caps

The Major

Students are required to take one of the introductory courses, CAPS 2827 (GOVT 2827) or CAPS 2570 (HIST 2571), during their first two years at Cornell, but they may declare the CAPS major before taking either of these or any other CAPS courses. The other required courses are:

- All of the following language courses: CHIN 1101-1102, 2201-2202, and 3301-3302 or CHIN 3306 (CAPS 3060) or CHIN 1109-1110 for heritage learners or the equivalent for FALCON students (all in Ithaca or Washington before senior year).
- Two 4000-level (or above) Chinese courses in Beijing and Ithaca.
- Two of the following lecture courses: CAPS 3857/GOVT 3857, CAPS 3140/HIST 3140, CAPS 3520/HIST 3520, and CAPS 4690/ECON 4690.
- All of the following seminars: CAPS 3000 and CAPS 5000 (during fall of junior year at Cornell in Washington), CAPS 3010 and CAPS 3020 (during fall of senior year at Peking University), and CAPS 4000 (during spring of senior year in Ithaca).

Students interested in the CAPS major should speak to the program director to arrange for a major advisor.

Externships

CAPS majors hold externships in government, business, law, the media, museums, research institutions, nongovernmental organizations, or other organizations during their semesters in Washington, D.C., and Beijing. They are encouraged to coordinate the two experiences.

Honors

To become a candidate for honors, a CAPS major must maintain a grade average of B+ and have approval for a senior essay proposal from a faculty advisor. During senior year, a CAPS honors student completes the research and writing of a senior essay by taking two tutorials, CAPS 4010 in Beijing and CAPS 4020 in Ithaca.

Introductory Courses

CAPS 2403 China under Revolution and Reform (also GOVT 2403) @ (SBA-AS)

Fall. 3 credits. A. Mertha.

For description, see GOVT 2403.

CAPS 2570 China Encounters the World (also ASIAN 2257, HIST 2571) @ (HA-AS)

Fall. 4 credits. X. Xu.
For description, see HIST 2571.

CAPS 2827 China and the World (also GOVT 2827) @ (CA-AS)

Spring. 3 credits. A. Carlson.
For description, see GOVT 2827.

Courses in Ithaca

[CAPS 2281 Antiquity and Modernity in Contemporary China (also ASIAN 2281) @ # (CA-AS)]

Spring. 3 credits. Next offered 2010–2011.
R. McNeal.]

[CAPS 2940 History of China in Modern Times (also HIST 2940, ASIAN 2294) @ (HA-AS)]

4 credits. Next offered 2010–2011.
S. Cochran.]

CAPS 3060 Readings in Chinese History, Culture, Society (also CHIN 3306) @

Spring. 4 credits. Z. Chen.
For description, see CHIN 3306.

CAPS 3140 History of American Foreign Policy, 1912 to Present (also AMST/HIST 3140) (HA-AS)

Spring. 4 credits. F. Logevall.
For description, see HIST 3140.

CAPS 3520 20th-Century Asian American Relations (also HIST 3520) @ (HA-AS)

Spring. 4 credits. Next offered 2010–2011.
J. Chen.]

[CAPS 3857 Seminar on American Foreign Policy (also GOVT 3857) (SBA-AS)]

4 credits. Next offered 2010–2011.
P. Katzenstein.]

CAPS 4020 Honors Thesis Tutorial II

Spring. 4 credits. Prerequisite: CAPS 4010.
Staff.

CAPS 4030 Issues in China and Asia-Pacific Studies @ (CA-AS)

Spring. 4 credits. X. Xin.

This course serves as the wrap-up seminar for CAPS students. It is designed for CAPS seniors to review their experience in conducting CAPS studies in Ithaca, Washington, D.C., and Beijing, to reflect the key challenges that they have encountered in such experiences and the solutions that they have come up with, and to enhance their basic abilities crucial for pursuing future studies and/or careers that are related to their CAPS experience after graduating from Cornell. Central to the course are the “course projects” that, with the assistance and support of instructor, the students are to take the initiative to develop by themselves.

CAPS 4690 China's Economy Under Mao and Deng (also ECON 4690) @ (SBA-AS)

Spring. 4 credits. T. Lyons.
For description, see ECON 4690.

CAPS 4827 Unifying While Integrating: China and the World (also GOVT 4827/6827) @ (HA-AS)

Spring. 4 credits. A. Carlson.
For description, see GOVT 4827.

CAPS 4870 Asia Security (also GOVT 4877/6877) @ (SBA-AS)

Spring. 4 credits. A. Carlson.
For description, see GOVT 4877.

[CAPS 4930 Problems in Modern Chinese History (also HIST 4930) @ (HA-AS)]

Next offered 2010–2011.]

CAPS 4999 CAPS Independent Study

Fall and spring. 1 to 4 credits. Prerequisite: junior or senior standing. Permission of instructor required. Staff.

Chinese Language Courses

CHIN 1101-1102 Beginning Mandarin I and II

1101, fall; 1102, spring. 6 credits each semester.

For description, see CHIN 1101–1102 under “Asian Studies.”

CHIN 1109-1110 Beginning Chinese Reading and Writing for Students of Chinese Heritage

1109, fall; 1110, spring. 6 credits each semester.

For description, see CHIN 1109–1110 under “Asian Studies.”

CHIN 2201-2202 Intermediate Mandarin I and II

2201, fall; 2202, spring. 4 credits each semester.

For description, see CHIN 2201–2202 under “Asian Studies.”

CHIN 2209-2210 Intermediate Chinese Reading and Writing for Students of Chinese Heritage

2209, fall; 2210, spring. 4 credits each semester.

For description, see CHIN 2009–2210 under “Asian Studies.”

CHIN 3301-3302 High Intermediate Mandarin I and II

3301, fall; 3302, spring. 4 credits each semester.

For description, see CHIN 3301–3302 under “Asian Studies.”

CHIN 3309-3310 Business Chinese in Cultural Context

3309, fall; 3310, spring. 4 credits each semester.

For description, see CHIN 3309–3310 under “Asian Studies.”

CHIN 4411-4412 Advanced Mandarin I and II

4411, fall; 4412, spring. 4 credits each semester.

For description, see CHIN 4411–4412 under “Asian Studies.”

CHIN 4426 Special Topics: Chinese Historical Documents on Modern China (also HIST 4650/6650; CHIN 6626)

Fall. 4 credits. Z. Chen.

For description, see HIST 4650.

CHIN 4427-4428 High Advanced Mandarin I and II

4427, fall; 4428, spring. 4 credits each semester.

For description, see CHIN 4427–4428 under “Asian Studies.”

CHIN 4431-4432 Directed Study

4431, fall; 4432, spring. 4 credits each semester.

For description, see CHIN 4431–4432 under “Asian Studies.”

Courses in Washington, D.C.

CAPS 3000 Seminar on American Relations with China (also ASIAN 3305, HIST 3391) (HA-AS)

Fall. 4 credits. Offered in Cornell in Washington program only. Staff.
A historical review of the fragile and volatile U.S.–China relationship from the opening by Richard Nixon in the early 1970s until the present. Several individual sessions will be led by current or former executive branch or congressional officials, business people, journalists, representatives of nongovernmental organizations and others who have worked in China or have participated in the making of U.S. policy toward China.

CAPS 4997 Research Seminar in American Studies (also HIST/AMST 4997)

Fall. 8 credits. Offered in Cornell in Washington program only. S. Jackson.
For description, see HIST 4997.

CAPS 4998 Politics and Policy: Theory, Research, and Practice (also GOVT/AMST/ALS 4998; PAM 4060)

Fall. 8 credits. Offered in Cornell in Washington program only. S. Jackson.
For description, see HIST 4997.

CHIN 4445 Directed Study for CAPS Students in D.C.

Fall. 1–4 credits, variable. Offered in Cornell in Washington program only. Staff.
Prerequisite: permission of instructor. Intended for advanced language study.

Courses in Beijing

CAPS 4001 China's Changing Politics, Economy, Society, and Culture @ (CA-AS)

Fall. 4 credits. Offered at Peking University for CAPS majors only. X. Xu and H. Duan.
Using resources specifically available in China, this course combines lectures, guest lectures, field trips, and faculty-directed research projects to help students achieve an in-depth understanding of China's changing politics, economy, society, and culture.

CAPS 4002 Chinese Perspectives on China's Foreign Relations @ (SBA-AS)

Fall. 4 credits. Offered at Peking University for CAPS majors only. Peking University staff.

This course, offered by faculty members of Peking University's School of International Studies, provides Chinese perspectives on contemporary China's international relations.

CAPS 4010 Honors Thesis Tutorial I

Fall. 4 credits. Offered at Peking University for CAPS majors only. See program director about making arrangements with appropriate advisors. Staff.

CHIN 4451 Advanced Mandarin for CAPS Students in Beijing

Fall. 4 credits. Equivalent to CHIN 4411 in Ithaca. Offered at Peking University for CAPS majors only. Staff.

For description, see CHIN 4411 under “Asian Studies.”

CHIN 4455 Directed Study for CAPS Students in Beijing

Fall. 1–4 credits, variable. Prerequisite: permission of instructor. Intended for advanced language study. Offered at Peking University for CAPS majors only. Staff.

CHIN 4457 High Advanced Mandarin

Fall. 4 credits. Equivalent to CHIN 4427 in Ithaca. Offered at Peking University for CAPS majors only. Staff.

For description, see CHIN 4427 under "Asian Studies."

CHINESE

FALCON Program (Chinese)

See Department of Asian Studies.

CLASSICS

C. Brittain, chair, F. M. Ahl, K. Bowes, T. Brennan, K. Clinton, G. Fine, K. Fisher, M. Fontaine (director of undergraduate studies), D. Mankin, S. Manning, A. Nussbaum, H. Pelliccia, P. Pucci, H. R. Rawlings III, E. Rebillard (director of graduate studies), A. Ruppel, J. Rusten, B. Strauss.

The Department of Classics at Cornell is one of the oldest in the country. It offers both the traditional core training in the languages, literature, philosophy, art, and history of ancient Greece and Rome, and also newer approaches developed from the comparative study of Mediterranean civilizations, peace studies, and feminist and literary theory. The broad range of instruction includes courses offered by professors with appointments in the Departments of History, Philosophy, Comparative Literature, History of Art, Linguistics, and Near Eastern Studies, and in the Programs of Archaeology, Medieval Studies, and Religious Studies.

The department offers a wide variety of classical civilization courses in English translation on such subjects as Greek mythology, ancient mystery religions, early Christianity, and Greek and Roman society; ancient epic, lyric, tragedy, comedy, satire, novels, and love-poetry; Periclean Athens, Republican Rome, the Roman Empire, and Plato, Aristotle, and Hellenistic philosophy. These courses are designed to introduce aspects of classical antiquity to the students with very divergent primary interests. Courses in art, archaeology, and dendrochronology also have wide appeal. These courses make use of the university's large collections of ancient coins and of reproductions of sculptures, inscriptions, and other ancient objects. For example, since 1976 over 500 Cornell students have worked in the Aegean Dendrochronology Project's laboratory, measuring the annual rings on thousands of samples of wood and charcoal, and using the rings to date structures as old as 7000 BC. In the summers selected students have participated in collecting trips around the eastern end of the Mediterranean (see web site at www.arts.cornell.edu/dendro). Students who wish to gain first-hand archaeological experience may also join one of several summer Cornell-sponsored field projects in Greece and Turkey.

The study of language is a vital part of classics. Offerings range from 1000-level classes designed to further the understanding of English through the study of the Latin and Greek sources of much of its vocabulary, to courses in linguistics on the morphology and syntax of the ancient languages, comparative grammar, and Indo-European (the

reconstructed source of the family of languages that includes Greek, Latin, Sanskrit, and most modern European languages).

The core function of the department is the study of ancient Greek and Latin. Elementary Greek and Latin are taught in both two-semester courses and intensive summer courses. (For students whose Latin is a bit rusty, the department also offers a rapid, one-semester review class.) Students with a more advanced knowledge of Greek or Latin can choose from a wide selection of courses, from intermediate language classes at the 2000 level, which refresh and broaden knowledge of syntax and vocabulary, to graduate and faculty reading groups. All of these courses concentrate on exciting literary texts, whether the poems of Catullus and Virgil, or the dialogues of Plato and Xenophon, at the 2000 level, or, in the advanced reading groups, the latest papyrological discoveries, such as the "new" fragments of Empedocles' cosmic poem or the "new" epigrams of Posidippus.

The primary purpose of language instruction is to make possible the study at first hand of the extraordinary range of powerful and challenging ideas embodied in Greek and Latin texts. The department offers undergraduate and graduate seminars on literary, linguistic, historical, and philosophical topics, studied through the Greek and Latin works of authors from Homer (probably from the eighth century BCE) to Boethius (sixth century CE), and occasionally from later writers such as Dante, Petrarch, or Milton. The department strives to adapt its program to the needs of individual students from all disciplines.

Majors in Classics

The major in Classics offers four tracks, which are Greek, Latin, classics, and classical civilization. Only classes passed with a C- or better may be applied to the classics major.

Classics

The classics track requires: (1) six courses in Greek and Latin numbered 2101 or above; (2) either CLASS 2675/HIST 2650 or one term of CLASS 2681/HIST 2670—CLASS 2682/HIST 2671, and (3) two courses in other related subjects selected in consultation with the student's departmental advisor (see below). Classics majors are required to take a minimum of two 3000-level courses in one language and one 3000-level course in the other.

Students who are considering graduate study in classics are strongly advised to complete the classics major.

Greek

The Greek track requires: (1) GREEK 1105; (2) five courses in Greek numbered 2101 or above; (3) CLASS 2675/HIST 2650; and (4) two courses in other related subjects selected in consultation with the student's departmental advisor (see below). The courses in Greek must include at least three at the 3000 level.

Latin

The Latin track requires: (1) LATIN 1205 or 2201; (2) five courses in Latin numbered 2202 or above; (3) one term of CLASS 2681/HIST 2670—CLASS 2682/HIST 2671; and (4) two courses in other related subjects selected in consultation with the student's departmental advisor (see below). The courses in Latin must include at least three at the 3000 level.

Classical Civilization

The classical civilization track requires: (1) either (a) two 2000-level courses in either ancient Greek or Latin, or (b) one course at the 2000 level in ancient Greek and Latin; (2) either (a): CLASS 2601 or 2603 and one term of CLASS 2681/HIST 2670—CLASS 2682/HIST 2671, or (b): CLASS 2612 and CLASS 2675/HIST 2650; (3) one course at the 2000 level in ancient Greek or Roman material culture; and (4) six additional courses in classical civilization, classical archaeology, ancient history, ancient philosophy, ancient Greek or Latin (at 2000 level or above), or related subjects (this last may number up to two, selected in consultation with the student's departmental advisor).

Related Subjects

Classics is an interdisciplinary field concerned with the study of Mediterranean civilizations from the 15th century BCE to the sixth century CE. Subjects in the field include Greek and Latin language, literature, and linguistics; ancient philosophy, history, archaeology, and art history; papyrology, epigraphy, and numismatics. In addition to the required courses in language and literature, the majors include a requirement for related courses intended to give breadth and exposure to the other disciplines within the field and to enrich the student's study of classical languages and literature. Since the influence of the Greek and Roman world extended far beyond antiquity, a related course may focus on some aspect of the classical tradition in a later period. Students select related courses in consultation with their departmental advisors or the director of undergraduate studies.

Honors

Candidates for the degree of bachelor of arts with honors in classics, Greek, Latin, or classical civilization must fulfill the requirements of the appropriate major and complete the two-semester honors course, CLASS 4721–4722. (Credit for the honors course may be included in the credits required for the major.) Candidates for honors must have a cumulative average grade of 3.0 and an average of 3.5 in their major. Students choose an honors advisor by the end of their sixth semester, in consultation with the departmental honors committee or the DUS. By the second week of their seventh semester, they submit an outline of their proposed research to their advisor and the committee. The thesis is written in the second semester of the course, under the supervision of the student's honors advisor. The level of honors is determined by the committee, in consultation with students' advisors. Copies of successful honors theses are filed with the department. Further details about this program are provided in the brochure *Guidelines for Honors in Classics*, available in the department office, 120 Goldwin Smith Hall, or on the department web page: www.arts.cornell.edu/classics/honors.asp.

Independent Study

Independent study at the 3000 level may be undertaken by undergraduates upon completion of one semester of work at the 3000 level in the relevant field and only with the permission of the director of undergraduate studies.

Study Abroad

Cornell is associated with four programs that provide opportunities for summer, semester, or yearlong study abroad in Greece and Italy. The American School of Classical Studies at Athens offers a summer program for graduate students and qualified undergraduates; College Year in Athens offers semester-long courses (consult Cornell Abroad for details). The Intercollegiate Center for Classical Studies in Rome provides semester-long courses in Latin, Greek, ancient history, art, archaeology, and Italian; the American Academy in Rome offers both full-year and summer programs for qualified graduate students. The Department of Classics awards several travel grants each year for graduate students from the Townsend Memorial Fund; undergraduates are eligible for the Caplan Travel Fellowships (see "Caplan Fellowships," below). Detailed information on these programs is available in the department office, 120 Goldwin Smith Hall.

Summer Support for Language Study

The Department of Classics has at its disposal resources to assist students who wish to enroll in intensive Latin or Greek in the Cornell summer session. These courses are designed to enable students to enter second-year Latin or Greek the following fall. Preference is given to undergraduate majors in classics and other students needing Latin or Greek for completion of their majors or graduate programs; dyslexic students are accorded additional preference. Two different kinds of support are available: (1) The Kanders-Townsend Prize Fellowship provides a stipend to cover up to \$4,600 in living expenses and full tuition for either GREEK 1103 or LATIN 1203, and is open only to freshman or sophomore classics majors (or potential classics majors) who have already begun one classical language and wish to start the other in the summer. (2) Classics department tuition support is open to Cornell undergraduate and graduate students and provides some level of tuition support, up to the full amount; no stipend for living expenses is offered. Applications are due to the chair of the Department of Classics by March 31. See also "Caplan Fellowships," below.

Placement in Greek and Latin

Placement of first-year undergraduates in Greek and Latin courses is determined by examinations given by the Department of Classics during orientation week. For details concerning these examinations, contact the director of undergraduate studies.

Satisfying the College Language Requirements with Greek or Latin

Ancient Greek: Option 1 is satisfied by taking GREEK 2101 or above. Option 2 is satisfied by taking either (a) GREEK 1101, 1102, and 1105 or (b) GREEK 1103 and 1105. (GREEK 1103 counts as two courses. Although credits for 1103 and 1105 add up to only 9, this sequence does satisfy Option 2 of the college's language requirement.)

Modern Greek: Option 1 is satisfied by taking GREEK 2144. Option 2 is satisfied by taking GREEK 1141, 1142 and 1143.

Latin: Option 1 is satisfied by taking LATIN 2201 or above. Option 2 is satisfied by taking either (a) LATIN 1201, 1202, and 1205 or (b) LATIN 1203 and 1205. (LATIN 1203 counts as two courses. Although credits for 1203 and

1205 add up to only 9, this sequence does satisfy Option 2 of the college's language requirement.) The sequence LATIN 1204-1205 does not satisfy Option 2. Students can place into LATIN 2201 with an A- or better in LATIN 1202, 1203 or 1204. Upon completing 2201, they satisfy Option 1. LATIN 1204 overlaps with LATIN 1202 therefore cannot be taken (or counted toward the degree) after completing LATIN 1202 or 1203.

First-Year Writing Seminars

The department offers first-year writing seminars on a wide range of classical and medieval topics. Consult John S. Knight Writing Seminar Program brochures for times, instructors, and descriptions.

Caplan Fellowships

The Harry Caplan Travel Fellowships are awarded annually to one or two outstanding juniors by the College of Arts and Sciences for summer travel or projects in Europe or the Near East. Interested juniors should consult the director of undergraduate studies.

Classical Civilization

CLASS 1692 Bioscientific Terminology (also BIOMI 1720) # (HA-AS)

Summer and winter. 3 credits. D. Bowman and H. Roisman.

A study of the Greek and Latin word elements that combine to form most of the specialized terms in the biological sciences. The student who learns the meanings of those elements and the rules of word formation can usually recognize the basic meaning of any unfamiliar word in that field. This skill is especially valuable for pre-law, pre-medical, pre-dental, pre-veterinary students and for those in other health and legal fields, as well as for students who would like to broaden their general vocabulary. This course would be excellent preparation for students prior to taking standardized test: e.g., SAT, GRE, MCAT, TOEFL, LSAT, etc.

CLASS 1699 English Words: Histories and Mysteries (also LING 1109) # (HA-AS)

Spring. 3 credits. Staff.

For description, see LING 1109.

CLASS 2601 The Greek Experience # (CA-AS)

Spring. 3 credits. Limited to 50 students. F. Ahl.

Introduction to the literature and thought of ancient Greece. Topics include epic and lyric poetry, tragedy and comedy, and historical, political, philosophical, and scientific writings. Some attention is also given to the daily life of ordinary citizens, supplemented by slides of ancient art and architecture.

CLASS 2603 Initiation to Greek Culture # (LA-AS)

Fall. 4 credits. Limited to 18 students.

Intended especially for freshmen. Students must apply in writing to chair, Department of Classics, 120 Goldwin Smith Hall. P. Pucci.

Knowledge of Greek or Latin is not necessary, since all texts are in translation. What is necessary is the willingness to participate in three one-hour seminars each week and also a supplementary one- or two-hour session, during which the class participates in workshops with specially invited guests. This course covers a wide range of Greek literary

and philosophical works as well as modern critical and philosophical writings on the Greeks. The focus throughout is on the status of language, the many forms of discourse that appear in the literature, and the attempts the Greeks themselves made to overcome the perceived inadequacies and difficulties inherent in language as the medium of poetry and philosophy. The course inquires into the development of philosophy in the context of a culture infused with traditional, mythological accounts of the cosmos. It asks how poetic forms such as tragedy responded to and made an accommodation with philosophical discourse while creating an intense emotional effect on the audience; how the first historians, using literary and philosophical discourse, created space for their own inquiry; and discusses how these issues persist and are formulated in our own thinking.

CLASS 2604 Greek Mythology # (LA-AS)

Summer and fall. 3 credits. Limited to 50 students in summer; 200 in fall. D. Mankin.

Survey of the Greek myths, with emphasis on the content and significance of the myths in Mediterranean society, including the place of myth in Greek life and consciousness; the factors and influences involved in the creation of myths; and the use of myths for our understanding of Greek literature, religion, and moral and political concepts.

CLASS 2605 Theater, Sport, and Spectacle: Performance and Competition in Greece and Rome (also THETR 2605) # (CA-AS)

Fall. 3 credits. J. Rusten.

A study not of play-texts or ancient history per se, but the social history of the richly documented tradition of competitive artistic, athletic, and spectacular performances sponsored by cities, wealthy individuals, and kings/emperors in antiquity, with special attention to the ongoing connections and cross-influences between music/theater, athletics, and human/animal combats. We will take our comparative material from the fifth century BCE to the late Roman empire. Topics include organizational frameworks, funding sources, associations of performers and their ideologies and rivalries, regulation and hierarchies of audiences, public claque, the adaptation of performance to political events, influence on art, and institutional and intellectual opposition. Evidence will include ancient treatises, inscriptions, mosaics, wall-paintings, and terracottas; all source readings available in English.

CLASS 2612 The Roman Experience # (CA-AS)

Spring. 3 credits. D. Mankin.

Introduction to the civilization of the Romans as expressed in their literature, religion, and social and political institutions.

CLASS 2613 Intro to New Testament and Other Early Christian Literature (also JWST/NES/RELST 2629) @ # (HA-AS)

Spring. 3 credits (see CLASS 3629 for additional 1 credit). K. Haines-Eitzen.

For description, see NES 2629.

[CLASS 2632 Paranoia and Conspiracy (also COML 2632) # (LA-AS)

Spring. 3 credits. Next offered 2010-2011. M. Fontaine.

This course examines paranoia, fearmongering, and conspiracies imagined in ancient Greece and Rome. Readings cover a range of literary and philosophical texts.]

[CLASS 2651 The Comic Theater (also COML/THETR 2230) # (LA-AS)

Spring. 3 credits. Next offered 2010–2011. J. Rusten.

Comic drama: Greece and Rome, Italian renaissance, Elizabethan England, Molière's France, English Restoration, and modern film. Themes: trickster, parody, farce, and caricature. All readings in English.]

[CLASS 2661 Ancient Philosophy (also PHIL 2200) # (KCM-AS)

Fall. 4 credits. T. Brennan.

For description, see PHIL 2200.

[CLASS 2675 Ancient Greece from Homer to Alexander the Great (also HIST 2650) # (HA-AS)

Fall. 4 credits. Open to first-year students. Next offered 2010–2011. B. Strauss.

For description, see HIST 2650.]

[CLASS 2676 Periclean Athens (also HIST 2580) # (HA-AS)

Fall. 4 credits. H. Rawlings III.

The first five weeks will provide a synoptic view of Athens' historical and cultural achievement in the middle of the fifth century BC—the traditional pinnacle of "The Glory that was Greece." Readings will be taken from Greek historians, philosophers, poets and documentary texts. The next seven to eight weeks will follow the course of the Peloponnesian War to its end; readings from Thucydides will be interwoven with contemporaneous texts composed by the dramatists (Sophocles, Euripides, and Aristophanes) and the sophists (supplemented with readings from Plato). The remaining classes will consider the fate of Socrates. The basic aim of the course is to approach an understanding of how and why a vital and creative society came unglued. There will be weekly discussion sections and at least two debates.

[CLASS 2680 War and Peace in Greece and Rome (also HIST 2560) # (HA-AS)

Spring. 4 credits. Next offered 2010–2011. B. Strauss.

For description, see HIST 2560.]

[CLASS 2681 History of Rome I (also HIST 2670) # (HA-AS)

Fall. 4 credits. Open to first-year students. Next offered 2010–2011. E. Rebillard.

A general introduction to Roman history from the foundation of Rome in the middle of the eighth century BC to the end of the Republic (31 BC).]

[CLASS 2682 History of Rome II (also HIST 2671) # (HA-AS)

Summer. 4 credits. Open to first-year students. L. Van Abbema.

This course is the second part of a two-term survey of Roman history, examines the history of the Roman Empire from the beginnings of the Augustan Principate (31 BC) to the fall of the Western Empire in the fifth century (AD 476). We will consider the creation and development of the imperial regime, explore the various types of challenges (military, cultural, and religious) to the hegemony of the Roman state, and try to understand the transformations of Roman society and culture down to the middle of the fifth century AD.

[CLASS 2686 Small Wars in Greece and Rome (also HIST 2061) # (HA-AS)

Fall. 3 credits. Next offered 2010–2011. B. Strauss.]

[CLASS 3625 Christianization of the Roman World (also HIST 3625, NES 3633, RELST 3635) # @ (HA-AS)

Fall. 4 credits. E. Rebillard.

In the fourth century CE the emperors decided to favor Christianity and shortly thereafter to forbid non-Christian activity. The "end of paganism," however, did not occur all at once if it ever did. The study of the Christianization of the Roman world is concerned with both the impact of Christian belief and practice on the late antique society and the resistance and/or persistence of the old beliefs and practices. This seminar will focus on the approaches to the problem of Christianization and on its documentation. Through readings and discussion, we will chart the transformations of the Roman world from 300 to 600 CE and try to get a better understanding of what remains one of the most fascinating historical problems of the ancient world.

[CLASS 3629 Intro to New Testament and Other Early Christian Literature (also JWST/NES/RELST 3629)

Spring. 1 credits K. Haines-Eitzen.

Extra credit option for students who have had one year of Greek, to read portions of the New Testament and other Christian writings in Greek. For description, see NES 3629.

[CLASS 3630 Senior Seminar # (LA-AS)

Spring. 4 credits. H. Pelliccia.

Topic: What is a classic? What is Classics? In this course we will study the history of the idea of the classic author or text from fourth century Greece forward to the late-20th-century "canon wars."

[CLASS 3642 Greeks, Romans, and Victorians (also COML 3820) # (LA-AS)

Spring. 4 credits. Next offered 2011–2012. F. Ahl.

Explores how 19th-century (and especially Victorian English and Irish) poets, dramatists, and to a lesser extent, novelists, present Greco-Roman antiquity.]

[CLASS 3644 Sages and Saints/Ancient World (also HIST 3644, RELST 3644) # (HA-AS)

Spring. 4 credits. Next offered 2011–2012. E. Rebillard.

This seminar considers the continuities and changes in the representations of the holy man, from the sages of classical antiquity to the saints of early Christianity.]

[CLASS 3645 The Tragic Theater (also COML 3440, THETR 3450) # (LA-AS)

Spring. 4 credits. Limited to 40 students. F. Ahl.

Tragedy and its audiences from ancient Greece to modern theater and film. Topics: origins of theatrical conventions; Shakespeare and Seneca; tragedy in modern theater and film. Works studied include: Aeschylus' *Agamemnon*; Sophocles' *Oedipus Tyrannus*, *Philoctetes*; Euripides' *Alcestis*, *Helen*, *Iphigeneia in Aulis*, *Orestes*; Seneca's *Thyestes*, *Trojan Women*; Shakespeare's *Julius Caesar*, *Titus Andronicus*, *Othello*; Strindberg's *The Father*; Dürrenmatt's *The Visit*; Bergman's *Seventh Seal*; Cacoyannis' *Iphigeneia*.

[CLASS 3661 Hellenistic Philosophy (also PHIL 3204) # (KCM-AS)

Spring. 4 credits. T. Brennan.

An examination of the doctrines of the Greek philosophers working in the three centuries after the death of Aristotle. Emphasis on Stoicism, Epicureanism, and Skepticism.

[CLASS 3669 Plato (also PHIL 3202) # (KCM-AS)

Fall. 4 credits. Prerequisite: at least one philosophy course at 2000 level or above; or permission of instructor. G. Fine. For description, see PHIL 3202.

[CLASS 3676 Greek and Roman Historiography # (HA-AS)

Spring. 4 credits. J. Rusten.

Rather than a survey of the history of ancient Greek and Rome, a study of the major ancient authors (from Herodotus through Ammianus Marcellinus) who invented and developed the genres of historical writing. We will examine their philosophical and educational aims, concepts of historical causation, demarcation of subject matter, as well as conventions and sub-genres of historiography in antiquity, and critics of historical styles and approaches. All readings in English.

[CLASS 3686 Independent Study in Classical Civilization, Undergraduate Level

Fall and spring. 1–4 credits. Prerequisite: permission of director of undergraduate studies, in extraordinary circumstances only.

[CLASS 4662 Topics in Ancient Philosophy (also PHIL 4200) # (KCM-AS)

Fall. 4 credits. G. Fine.

For description, see PHIL 4200.

[CLASS 4681 Fourth Century and Early History of Greece (also HIST 4411) # (HA-AS)

Fall. 4 credits. Undergrads and grads will meet for two hours; grad students must stay for one additional hour. Next offered 2011–2012. B. Strauss.]

[CLASS 4682 Topics in Ancient Greek History (also CLASS 7684, HIST 4320/6330)

Spring. 1–4 credits, variable. Limited to 15 students. Next offered 2011–2012. Staff.]

[CLASS 4683 Classics and Early America (also HIST 4861, GOVT 4862) # (HA-AS)

Fall. 4 credits. Next offered 2010–2011. H. Rawlings III.

This seminar focuses on the Founders' use of Greek and Roman models in establishing the American Republic.]

[CLASS 7173 Ancient Philosophy (also PHIL 6200)

Fall. 4 credits. G. Fine.

For description, see PHIL 6200.

[CLASS 7345 Graduate TA Training

Fall and spring. 1 credit. Staff. Pedagogical instruction and course coordination. Requirement for all graduate student teachers of LATIN 1201–1202 and first-year writing seminars.

[CLASS 7459 Seminar in Vedic Philology (also ASIAN/LING 6659)

Spring. 4 credits. Prerequisite: two years of Sanskrit or permission of instructor.

M. Weiss.

For description, see LING 6659.

[CLASS 7681 Fourth Century and Early Hellenistic History of Greece (also HIST 6411)

Fall. 4 credits. B. Strauss.

For description, see HIST 6411.

CLASS 7682 Topics in Ancient History (also HIST 6300, NES/JWST 6642)

Spring. 4 credits. E. Rebillard.

Topic: Sharing the City: Pagans, Jews and Christians in Late Antiquity.

CLASS 7960 Independent Study in Classical Studies

Fall and spring. Up to 4 credits.

CLASS 9900 Doctoral Dissertation Research

Fall and spring. 0 credits. Letter grades only. Staff.

Greek**GREEK 1101 Elementary Ancient Greek I**

Fall. 4 credits. H. Pelliccia.

Introduction to Attic Greek. Designed to enable the student to read the ancient authors as soon as possible.

GREEK 1102 Elementary Ancient Greek II

Spring. 4 credits. Prerequisite: GREEK 1101 or equivalent. A. Ruppel.

Continuation of GREEK 1101, prepares students for GREEK 1105.

GREEK 1103 Intensive Greek

Summer. 6 credits. Staff.

Intensive introduction combining the fundamentals of ancient Greek grammar with readings from a variety of classical authors in the original Greek. Prepares students in a single semester for GREEK 1105.

GREEK 1105 Intermediate Ancient Greek I #

Fall. 3 credits. Prerequisites: GREEK 1102, 1103, or placement by departmental exam. P. Pucci.

Introduces students to reading Greek literary texts (Xenophon's *Anabasis*) and a dialogue of Plato. Covers complex syntax and reviews the grammar presented in GREEK 1102 or 1103.

GREEK 1141 Elementary Modern Greek I (also NES 1340)

Fall. 4 Credits. K. Yiavis.

The course is intended for students with no experience in modern Greek. The goal is to provide a thorough grounding in Greek language with an emphasis on communication. Small class size will provide intensive practice in speaking, writing and listening-comprehension. Elementary Modern Greek II will be offered in the spring semester.

GREEK 1142 Elementary Modern Greek II (also NES 1341)

Spring. 4 credits. Prerequisite: NES 1340/GREEK 1141 or placement by departmental exam. K. Yiavis.

Intended for students with no experience in Greek. The goal is to provide a thorough grounding in Greek language with an emphasis on communication. Small class size provides intensive practice in speaking, writing, and listening/comprehension.

GREEK 1143 Intermediate Modern Greek I (also NES 1342)

Fall. 4 credits. Prerequisite: GREEK 1142/NES 1341 or placement by departmental exam. K. Yiavis.

Emphasizes complex grammatical and syntactical phenomena of the Modern Greek language through oral communication and texts. Students look into idiomatic nuances and special features of the language. Oral

speech and writing are more crucial at this level.

[GREEK 2101 Greek Prose # (LA-AS)

Fall. 3 credits. *Satisfies Option 1.*

Prerequisite: GREEK 1105. Next offered 2010-2011. M. Fontaine.

Selected readings from Herodotus' *Histories*.]

[GREEK 2103 Homer # (LA-AS)

Spring. 3 credits. *Satisfies Option 1.*

Prerequisite: GREEK 1105. Next offered 2010-2011. Staff.

Readings in the Homeric epic.]

GREEK 2104 Euripides: Alcestis # (LA-AS)

Spring. 3 credits. *Satisfies Option 1.*

Prerequisite: GREEK 1105. P. Pucci.

With the *Alcestis* we encounter Greek tragedy in one of its Euripidean versions: serious events and comic happenings interlace and weave a most mysterious analysis of human responses to death, to marriage relationship, to myth. The text has no long choruses and therefore is also easier for students with a short experience of Greek. This is a wonderful introduction to Greek Tragedy.

GREEK 2144 Intermediate Modern Greek II (also NES 2324)

Spring. 4 credits. *Satisfies Option 1.*

Prerequisite: GREEK 1143/NES 1342 or placement by departmental exam.

K. Yiavis.

This course emphasizes complex grammatical and syntactical phenomena of the Modern Greek language through oral communication and texts. Students look into idiomatic nuances and special features of the language. Oral speech and writing are more crucial at this level.

[GREEK 3101 Greek Epic # (LA-AS)

Spring. 4 credits. *Satisfies Option 1.*

Prerequisite: one 2000-level Greek course. Next offered 2011-2012. P. Pucci.

Undergraduate Seminar. This course focuses on the epic language, its specificity, its poetic means (epithets, formulae, similes, etc.), its function in constructing and interpreting the world, and its aesthetic, emotional effects.]

[GREEK 3102 Greek Historiography and Oratory # (HA-AS)

Fall. 4 credits. *Satisfies Option 1.*

Prerequisite: one 2000-level Greek course. Next offered 2010-2011. Staff.

Undergraduate seminar. History and myth in Herodotus and Plato. Readings in Greek from Herodotus' *Histories* and Plato's *Phaedrus*, *Critias*, and *Timaeus*.]

GREEK 3103 Greek Philosophy and Rhetoric (LA-AS)

Spring. 4 credits. *Satisfies Option 1.*

Prerequisite: one 2000-level Greek course. H. Rawlings III.

Undergraduate seminar. Topic: Greek rhetoric. We will read speeches by several Greek orators.

GREEK 3104 Seminar: Greek Drama (LA-AS)

Fall. 4 credits. *Satisfies Option 1.*

Prerequisite: one 2000-level Greek course. H. Pelliccia.

GREEK 3185 Independent Study in Greek, Undergraduate Level

Fall and spring. Up to 4 credits.

Prerequisite: permission of DUS in extraordinary circumstances only. Staff.

GREEK 4101 Advanced Readings in Greek Literature # (LA-AS)

Fall. 4 credits. Prerequisite: one semester

of 3000-level Greek. H. Rawlings III.

In reading the texts, we will analyze the historiographical methods employed by Herodotus and Thucydides: their use of sources, their epistemologies, their means of representing events, their positions in the intellectual context of their times.

[GREEK 4102 Advanced Readings in Greek Literature # (LA-AS)

Spring. 4 credits. Prerequisite: one semester

of 3000-level Greek. Next offered 2010-2011. Staff.]

GREEK 4116 Advanced Greek Composition (LA-AS)

Spring. 4 credits. Prerequisite: GREEK 3116 or equivalent. J. Rusten.

GREEK 7171 Graduate Seminar in Greek

Fall. 4 credits. J. Rusten.

Topic: The fragments of Athenian comedy, 486-280 BCE. Readings of the substantial remains of comedies apart from the 11 preserved plays of Aristophanes and the three of Menander. Particular attention to the evidence for the earliest comedy and its relation to politics, the plays of Aristophanes's rivals Cratinus (*Phlutuses*, *Dionysalexander*, *The Wine-flask*) and Eupolis (*Demes*, *Baptai*, *Toadies*, *Maricas*), the 4th-century comedy of Antiphanes and Timocrates, the more than 100 paintings from Southern Italy illustrating scenes of 4th-century comedy, Menander's partially preserved plays (*She Gets a Haircut*, *The Shield*, *the Sicyonian*), and the plays that lie behind the Latin adaptations of the third and second centuries BCE.

GREEK 7172 Graduate Seminar in Greek

Spring. 4 credits. P. Pucci.

Topic: Aristophanes.

GREEK 7910 Independent Study in Greek

Fall and spring. 1-4 credits.

Latin**LATIN 1201 Elementary Latin I**

Fall. 4 credits. Staff.

Introductory course designed to prepare students to start reading Latin prose at the end of a year. The class moves swiftly and includes extensive memorization of vocabulary and paradigms; study of Latin syntax; and written homework, quizzes, tests, and oral drills.

LATIN 1202 Elementary Latin II

Spring. 4 credits. *Students may not receive credit for both LATIN 1202 and LATIN 1204.*

Students should be ready for LATIN 1205 by the end of the course, but may take LATIN 2201 if they pass with A- or better. Prerequisite: 1201 or equivalent. Staff.

Continuation of LATIN 1201, using readings from various authors; prepares students for LATIN 1205.

LATIN 1203 Intensive Latin

Summer. 6 credits. Staff.

Intensive introduction that quickly instills the essentials of Latin grammar before progressing to readings in the original Latin. Prepares students in a single term for LATIN 1205.

LATIN 1204 Latin in Review

Fall. 4 credits. *Students may not receive credit for both LATIN 1202 and LATIN 1204.*

Prerequisite: placement by departmental examination. Staff.

Designed to accommodate students who have had some Latin, but are insufficiently prepared to take 1202. It begins with review of some material covered in 1201 and then continues with second-term Latin material (1202). The class moves swiftly and includes extensive memorization of vocabulary and paradigms; study of Latin syntax; and written homework, quizzes, tests, and oral drills. Students should be ready for LATIN 1205 by the end of the course, but may take LATIN 2201 if they pass with A- or better.

LATIN 1205 Intermediate Latin I

Fall and spring. 3 credits. Prerequisites: LATIN 1202, 1203, 1204 or placement by departmental exam. Fall, D. Mankin; spring, A. Ruppel.

Introduces students to reading a literary Latin text (Ovid, *Ars Amatoria I*). Covers complex syntax and reviews the grammar presented in LATIN 1202, 1203, or 1204.

LATIN 2201 Latin Prose # (LA-AS)

Fall. 3 credits. *Satisfies Option 1*. Prerequisite: LATIN 1205 or grade of A- or above in LATIN 1202, 1203, or 1204 or placement by departmental exam. E. Rebillard.

Reading of Nepos' *Life of Atticus*, a wealthy and cultured Roman who himself stayed out of politics, but was the confidant of the Republic's greatest politician, Cicero; readings also of Nepos' *Life of Cato the Elder* and selections from Cicero's *Letters to Atticus*.

[LATIN 2203 Catullus # (LA-AS)]

Fall. 3 credits. *Satisfies Option 1*. Prerequisite: LATIN 1205. Next offered 2011–2012. Staff.

Aims to present the poems of Catullus within their cultural and historical context. The poems are read and translated, and their significance both individually and as products of Late Roman Republican culture discussed in class. Selections from the works of Catullus's contemporaries are assigned in translation.]

LATIN 2204 Roman Drama # (LA-AS)

Spring. 3 credits. *Satisfies Option 1*. Prerequisite: LATIN 1205. D. Mankin. Topic: TBA.

[LATIN 3201 Roman Epic # (LA-AS)]

Spring. 3 credits. *Satisfies Option 1*. Prerequisite: 2000-level Latin. Next offered 2010–2011. Staff.

Undergraduate seminar.]

[LATIN 3202 Roman Historiography # (LA-AS)]

Spring. 4 credits. *Satisfies Option 1*. Prerequisite: one term of 2000-level Latin or permission of instructor. Next offered 2011–2012. Staff.

Undergraduate seminar. Topic: TBA.]

LATIN 3203 Roman Poetry (LA-AS)

Fall. 3 credits. *Satisfies Option 1*. Prerequisite: one 2000-level Latin course. M. Fontaine.

Undergraduate seminar. Topic: Neoteric poetry.

LATIN 3204 Roman Prose # (LA-AS)

Spring. 3 credits. *Satisfies Option 1*. Prerequisite: one 2000-level Latin course. H. Pelliccia.

Undergraduate seminar.

[LATIN 3215 Imperial Latin

Spring. 4 credits. *Satisfies Option 1*. Prerequisite: one semester of 2000-level Latin. Next offered 2011–2012. Staff. Undergraduate Latin seminar. Topic: TBA.]

[LATIN 3217 Latin Prose Composition # (LA-AS)]

Fall. 4 credits. Prerequisite: one semester of 2000-level Latin. Next offered 2010–2011. Staff.]

LATIN 3286 Independent Study in Latin, Undergraduate Level

Fall and spring. Variable to 4 credits. Prerequisite: permission of DUS in extraordinary circumstances only. Staff.

LATIN 4201 Advanced Readings in Latin Literature # (LA-AS)

Fall. 4 credits. Prerequisite: one semester of 3000-level Latin. M. Fontaine. Topic: Ovid's *Metamorphoses*.

LATIN 4202 Advanced Readings in Latin Literature # (LA-AS)

Spring. 4 credits. Prerequisite: one semester of 3000-level Latin. C. Brittain. Topic: Epistolography.

[LATIN 4203 Survey of Latin Literature # (LA-AS)]

Fall. 4 credits. Seniors must obtain permission from the instructor to enroll in the class. Next offered 2010–2011.]

[LATIN 4213 Survey of Medieval Latin Literature (also LATIN 7213, MEDVL 4103/6103) # (LA-AS)]

Fall. 3 credits. Next offered 2010–2011. C. Ruff.

For description, see MEDVL 4103.]

[LATIN 4216 Advanced Latin Prose Composition # (LA-AS)]

Fall. 4 credits. Prerequisite: graduate standing; undergraduates who have completed LATIN 3217 and have permission of instructor. Next offered 2010–2011. Staff.]

[LATIN 4223/7223 Topics in Medieval Latin Literature (also MEDVL 4201/6201)]

Spring. 4 credits. Next offered 2010–2011.]

[LATIN 7213 Survey of Medieval Latin Literature (also MEDVL 4103/6103, LATIN 4213)]

Fall. 3 credits. Next offered 2011–2012. C. Ruff.

For description, see MEDVL 4103.]

[LATIN 7222 Latin Paleography (also MEDVL 6102)]

Spring. 4 credits. Next offered 2011–2012.]

LATIN 7262 Latin Philosophical Texts (also PHIL 4002, RELST 6020) # (KCM-AS)

Fall and spring. 1–4 credits. Prerequisites: knowledge of Latin and permission of instructor. C. Brittain and S. MacDonald. For description, see PHIL 6020.

LATIN 7271 Graduate Seminar in Latin (also PHIL 6201)

Fall. 4 credits. C. Brittain. Topic: Cicero's Philosophical Text.

LATIN 7272 Graduate Seminar in Latin

Spring. 4 credits. M. Fontaine. Topic: Lucretius.

LATIN 7920 Independent Study in Latin

Fall and spring. 1–4 credits. Staff.

Classical Art and Archaeology

CLASS 2700 Introduction to Art History: The Classical World (also ARTH 2200) # (HA-AS)

Spring. 4 credits. Each student must enroll in a sec. K. Fisher.

For description, see ARTH 2200.

[CLASS 2727 Art and Archaeology in the Ancient Mediterranean World (also ARKEO 2728, ARTH 2227) # (HA-AS)]

Fall. 4 credits. Next offered 2011–2012. S. Manning.

This course introduces students to a selection of the major themes and issues in the archaeology and art of the ancient Mediterranean region from the later prehistoric period (the Bronze Age) through to the Roman era.]

[CLASS 2743 Archaeology/Roman Private Life (also ARKEO 2743, ARTH 2221) # (CA-AS)]

Spring. 3 credits. Next offered 2011–2012. Staff.

Introduction to Roman archaeology through everyday lives of Romans.]

[CLASS 2744 Archaeology of Greek Private Life (also ARKEO/HIST 2744, ARTH 2222) # (CA-AS)]

Spring. 3 credits. Next offered 2010–2011. K. Bowes.

This course offers an overview of the archaeology of the ancient Greek world, focusing on the everyday lives.]

[CLASS 3727 Iconography of Greek Myth (also ARTH 3230) # (HA-AS)]

Spring. 4 credits. Next offered 2010–2011. A. Alexandridis.

For description, see ARTH 3230.]

[CLASS 3730 Archaeology, Ethics, and Nationalism (also ARKEO 3730, HIST 3630) # (CA-AS)]

Spring. 3 credits. Next offered 2010–2011. K. Bowes.

This course explores the historical and ethical ramifications of doing archaeology.]

[CLASS 3731 Archaeology/Ancient Mediterranean Religion (also ARKEO 3731) # (HA-AS)]

Fall. 4 credits. Next offered 2011–2012. K. Bowes.

This course will survey the material remains of religious practices in the ancient Mediterranean from the Greek Dark Ages to early Christianity.]

[CLASS 3733 Bronze Age Palaces and Societies (also ARKEO 3733)]

Fall. 4 credits. Prerequisite: one 2000-level or above classical archaeology or archaeology course. K. Fisher.

This course will examine the origins and development of the Bronze Age civilizations that arose in mainland Greece and on the islands of Crete and Cyprus, ca. 3000–1000 bc. Archaeological evidence and textual sources will be used to explore various aspects of Minoan, Mycenaean and Late Cypriot society, including daily life, religion, economy and long-distance exchange, warfare, mortuary practices, art and architecture. Emphasis is placed on how the palaces, both as monumental buildings and as governing institutions, shaped these various aspects of Bronze Age society.]

CLASS 3744 Hellenistic Culture (also ARTH 3224)

Spring. 4 credits. A. Alexandridis.
For description, see ARTH 3224.

CLASS 3750 Introduction to Dendrochronology (also ARKEO 3090, ARTH 3250, EAS 3750) # (HA-AS)

Fall. 4 credits. Limited to 10 students.
Prerequisite: permission of instructor. Letter grades only. S. Manning.

Introduction and training in dendrochronology and its application to archaeology, art history, and environmental stress through participation in a research project dating ancient to modern tree-ring samples from both the Mediterranean and the Upper New York State region. Supervised reading, laboratory/project work, field trip(s) in local area. A possibility exists for summer fieldwork in the Mediterranean.

[CLASS 4733 Sexuality in Greek and Roman Art (also ARTH 4236/6236) # (CA-AS)

Fall. 4 credits. Next offered 2010-2011.
A. Alexandridis.
For description, see ARTH 4236.]

CLASS 7729 Emergence of Greek Civilization (also ARKEO 7729)

Spring. 4 credits. S. Manning.
What happened before Classical Greece? Seminar with a focus on the development of complex to state-level society in the Aegean, and its relations with neighboring regions, from the start of the Neolithic through the Bronze Age and down to Homer.

[CLASS 7742 Research Methods in Archaeology (also ARKEO 7742, ARTH 6252) # (HA-AS)

Spring. 4 credits. Next offered 2010-2011.
S. Manning.]

Greek and Latin Linguistics**[GREEK 4411 Greek Comparative Grammar (also LING 4451) (KCM-AS)**

Spring. 4 credits. Prerequisite: thorough familiarity with morphology of classical Greek. Next offered 2010-2011.
A. Nussbaum.

The prehistory and evolution of the sounds and forms of ancient Greek as reconstructed by comparison with the other Indo-European languages.]

[LATIN 4452 Latin Comparative Grammar (also LING 4452) (KCM-AS)

Fall. 4 credits. Prerequisite: thorough familiarity with morphology of classical Latin. Next offered 2010-2011.
A. Nussbaum.

The prehistory and evolution of the sounds and forms of Classical Latin as reconstructed by comparison with the other Indo-European languages.]

[LATIN 4453 Structure of Latin (also LING/ROMS 4453) # (KCM-AS)

Fall. 4 credits. Cannot be used toward the language course major requirement. Next offered 2010-2011. Staff.
For description, see LING 4453.]

GREEK 4455 Greek Dialects (also LING 4455) (KCM-AS)

Fall. 4 credits. A. Nussbaum.
Survey of the dialects of ancient Greek through the reading and analysis of representative epigraphical and literary texts.

LATIN 4456 Archaic Latin (also LING 4456) (LA-AS)

Spring. 4 credits. Prerequisite: reading knowledge of Latin. M. Weiss.
Reading of epigraphic and literary pre-Classical texts with special attention to archaic and dialectal features. The position of Latin among the Indo-European languages of ancient Italy, the rudiments of Latin historical grammar, and aspects of the development of the literary language.

[GREEK 4457 Homeric Philology (also LING 4457) # (LA-AS)

Spring. 4 credits. Prerequisite: ability to read Homeric Greek. Next offered 2011-2012. A. Nussbaum.
Language of the Homeric epics: dialect background, archaisms, modernizations. Notion of a *Kunstsprache*: its constitution, use, and internal consistency. Phonological and morphological aspects of epic compositional technique.]

[GREEK 4459 Mycenaean Greek (also LING 4459) (LA-AS)

Spring. 4 credits. Prerequisite: thorough familiarity with morphology of Classical Greek. Next offered 2011-2012. Staff.]

Sanskrit**CLASS 1331-1332 Elementary Sanskrit (also LING/SANSK 1131-1132)**

1331, fall; 1332, spring. 4 credits each semester. Prerequisite: for 1331, none; for 1332, 1331. Fall, A. Nussbaum; spring, A. Ruppel.
For description, see SANSK 1131-1132.

CLASS 2351-2352 Intermediate Sanskrit (also LING/SANSK 2251-2252) @ #

2351, fall; 2352, spring. 3 credits each semester. *CLASS 2351 satisfies Option 1.* Prerequisite: CLASS 1332 or equivalent. L. McCrea.
For description, see SANSK 2251-2252.

CLASS 3391 Independent Study in Sanskrit, Undergraduate Level

Fall and spring. Variable to 4 credits. Prerequisite: permission of director of undergraduate studies, in extraordinary circumstances only. Staff.

CLASS 3393 Advanced Sanskrit I (also SNLIT 3301) @ (LA-AS)

Fall. 4 credits. L. McCrea.
For description, see SNLIT 3301.

CLASS 3394 Advanced Sanskrit II (also SNLIT 3302) @ (LA-AS)

Spring. 4 credits. L. McCrea.
For description, see SNLIT 3302.

[CLASS 4490 Sanskrit Comparative Grammar (also LING 4460) (KCM-AS)

Fall. 4 credits. Next offered 2010-2011.
A. Nussbaum.
Survey of the historical phonology and morphology of Sanskrit in relation to the Indo-Iranian and Indo-European comparative evidence.]

CLASS 7950 Independent Study in Sanskrit

Fall and spring. Variable to 4 credits. Staff.

Honors Courses**CLASS 4721-4722 Honors Course: Senior Essay**

Fall and spring. 8 credits. Student must choose advisor by end of sixth semester. Topics must be approved by Standing Committee on Honors by beginning of seventh semester.
See "Honors" under Classics front matter.

COGNITIVE SCIENCE PROGRAM

M. Christiansen (psychology) and Jeff Hancock (information science), directors. G. Gay, J. Hancock (communication); C. Cardie, R. Constable, J. Halpern, D. Huttenlocher, T. Joachims, L. Lee, B. Selman, R. Zabih (computer science); G. Evans, A. Hedge (design and environmental analysis); K. Basu, L. Blume, D. Easley (economics); J. Dunn, R. Ripple, D. Schrader (education); S. Wicker (electrical and computer engineering); M. Belmonte, C. Brainerd, M. Casasola, S. Ceci, B. Koslowski, B. Lust, V. Reyna, S. Robertson, Q. Wang, E. Wethington, W. Williams (human development); K. O'Connor, J. Russo, M. Thomas-Hunt (Johnson Graduate School of Management); J. Bowers, A. Cohn, M. Diesing, W. Harbert, S. McConnell-Ginet, A. Miller-Ockhuizen, M. Rooth, C. Rosen, Y. Shirai, M. Wagner, J. Whitman, D. Zec (linguistics); A. Nerode, R. Shore (mathematics); H. Lipsion, F. Valero-Cuevas (mechanical and aerospace engineering); R. Harris-Warrick, H. Howland, R. Hoy, C. Linster, H. K. Reeve (neurobiology and behavior); R. Boyd, M. Eklund, C. Ginet, H. Hodes, D. Pereboom, S. Shoemaker, B. Weatherston (philosophy); T. Cleland, J. Cutting, R. Darlington, T. DeVoogd, D. Dunning, S. Edelman, M. Ferguson, D. Field, B. Finlay, T. Gilovich, M. Goldstein, B. Halpern, A. Isen, R. Johnston, C. Krumhansl, U. Neisser, D. Pizarro, E. Adkins Regan (psychology); M. Macy (sociology). R. Canfield, S. Hertz (associate members).

Cognitive Science comprises a number of disciplines that are linked by a major concern with fundamental capacities of the mind, such as perception, memory, reasoning, language, the organization of motor action, and their neural correlates. In the College of Arts and Sciences these disciplines are represented in the departments of Computer Science, Economics, Linguistics, Mathematics, Neurobiology and Behavior, Philosophy, Psychology, and Sociology. Elsewhere in the university they are represented in the departments of Mechanical and Computer Engineering, and Mechanical and Aerospace Engineering (College of Engineering); the departments of Design and Environmental Analysis and Human Development (College of Human Ecology); the departments of Communication and Education (College of Agriculture and Life Sciences); the Information Science Program, and the Johnson Graduate School of Management.

The issues addressed in Cognitive Science arise at several levels. At the broadest level are problems of characterizing such basic notions as "mind," "knowledge," "information," and "meaning." At a more specific level are questions regarding the abstract operating principles of individual components of the mind, such as those underlying visual perception, language ability, and understanding of concepts. These principles

concern the organization and behavior of the components and how they are biologically represented in the brain. At the most specific level are questions about the properties of the elementary computational structures and processes that constitute these components.

Important insights into issues of these kinds have been achieved in recent years as a result of the various Cognitive Science disciplines converging in their theoretical and methodological approaches. It is this convergence, in fact, that warrants grouping the disciplines together under the single term "Cognitive Science." Even greater progress can be expected in the future as a consequence of increasing cooperation among the disciplines.

Undergraduate Minor

An interdisciplinary undergraduate minor in Cognitive Science is available to Cornell University undergraduates in the College of Arts and Sciences. Students from other colleges who seek such a minor should discuss such possibilities with the Cognitive Science office, which will provide information and contacts concerning such minors.

The undergraduate minor in Cognitive Science is designed to enable students to engage in a structured program directly related to the scientific study of cognition and the mind. The minor provides a framework for the design of structured, supervised programs of study in this growing interdisciplinary field. Such programs of study serve as complements to course work in a single discipline as represented by an individual department. It is considered crucial that students gain a strong background in their major, independent of their work in the minor. Independent majors and college scholars may also apply. Colleges vary in their procedures for formal recognition of this minor (contact the Cognitive Science office for details). The Cognitive Science Program faculty have designed five structured "tracks" that offer students different ways of satisfying the minor. In addition, students are always able to construct their own programs of study subject to approval by their minor advisor. The courses listed under each track are program suggestions. The student should consult his or her Cognitive Science advisor to develop a more customized curriculum. In some cases, students may want to combine or cross tracks.

In general, it is expected that students in the minor will take COGST 1101 or COGST 2140 as their introductory course requirement; either COGST 4120, COGST 4160, COGST 4500, or COGST 4700 as their lab course requirement; and three courses at the 3000 and 4000 level in at least two departments (or certain suitable 2000-level courses by petition). Courses are to be chosen by student and advisor to provide a coherent program. Even though only five courses are required to complete the minor, we assume students interested in Cognitive Science will often end up taking more. An independent research project (e.g., COGST 4700 if this is not used to satisfy the lab requirement) and a research workshop (COGST 4710) are encouraged. Please note: minor modifications to this outline may be made in extenuating circumstances by the advisor, in consultation with the program director.

The five typical tracks are as follows. Note that many of these courses have substantial prerequisites.

1. Perception and Cognition

This track focuses on psychological, computational, and neurobiological approaches to the interface between perception and cognition. Students will develop a grasp of the continuum between sensory impressions and complex thought.

BIONB 3260 The Visual System
 BIONB 4330/COGST 4310/PSYCH 5310
 Consciousness and Free Will
 COGST 1101/CS 1710/LING 1170/PHIL
 1910/PSYCH 1102 Introduction to
 Cognitive Science
 COGST/PSYCH 2140 Cognitive Psychology
 COGST/PSYCH 3420 Human Perception:
 Applications to Computer Graphics, Art,
 and Visual Display
 COGST/PSYCH 4160 Modeling Perception
 and Cognition
 COGST 4500/HD 4370/LING 4500/PSYCH
 4370 Lab Course: Language
 Development
 COGST 4650/CS 3920/PSYCH 4650 Topics
 in High-Level Vision
 PSYCH 3050 Visual Perception
 PSYCH 3160 Auditory Perception
 PSYCH 4120 Laboratory in Cognition and
 Perception
 PSYCH 4180 Psychology of Music

2. Language and Cognition

This track focuses on the representation, processing, and acquisition and learning of language, as well as its role in cognition and culture. Students will acquire skills and knowledge in formal and applied linguistic theory, psycholinguistic experimentation, and computational modeling techniques.

COGST 1101/CS 1101/LING 1170/PHIL
 1910/PSYCH 1102 Introduction to
 Cognitive Science
 COGST/PSYCH 2140 Cognitive Psychology
 COGST/LING/PSYCH 2150 Psychology of
 Language
 COGST/PSYCH 4270 Evolution of
 Language
 COGST/LING/PSYCH 4280 Connectionist
 Psycholinguistics
 COGST 4340/HD 4240 Current Topics in
 Cognitive Development
 COGST/HD 4360/LING 4436/PSYCH 4360
 Language Development
 COGST 4500/HD 4370/LING 4500/PSYCH
 4370 Lab Course: Language
 Development
 CS 4110 Programming Languages and
 Logics
 LING 3301–3302 Introduction to Phonetics
 LING 3303 Introduction to Syntax
 LING 3304 Introduction to Semantics
 Pragmatics
 LING 4403 Syntax I, II
 LING 4421–4422 Semantics I and II
 PHIL 3320 Philosophy of Language

3. Cognition and Information Processing

This track focuses on how the mind (or a computer) can encode, represent, and store information. Students will develop an understanding of concepts, categories, memory, and the nature of information itself.

COGST 1101/CS 1101/LING 1170/PHIL
 1910/PSYCH 1102 Introduction to
 Cognitive Science
 COGST/PSYCH 2140 Cognitive Psychology

COGST/PSYCH 4140 Comparative
 Cognition
 COGST 2340/HD 3340 The Growth of the
 Mind
 COGST/HD 4320 Cognitive, Social, and
 Developmental Aspects of Scientific
 Reasoning
 COGST 4500/HD 4370/LING 4500/PSYCH
 4370 Lab Course: Language
 Development
 CS 2110 Computers and Programming
 CS 4700 Foundations of Artificial
 Intelligence
 CS 4701 Practicum in Artificial Intelligence
 PSYCH 4120 Laboratory in Cognition and
 Perception
 PSYCH 4130 Information Processing:
 Conscious and Nonconscious
 PSYCH 4150 Concepts, Categories, and
 Word Meanings
 PSYCH 4170 The Origins of Thought and
 Knowledge

4. Cognitive Neuroscience

This track focuses on neurobiological and computational approaches to understanding how perception and cognition emerge in the human brain. Students will acquire knowledge of what neural structures subserve what perceptual/cognitive processes, and how they interact.

COGST 1101/CS 1101/LING 1170/PHIL
 1910/PSYCH 1102 Introduction to
 Cognitive Science
 COGST/PSYCH 2140 Cognitive Psychology
 COGST/HD 2200 The Human Brain and
 Mind
 COGST/BIONB/PSYCH 3300 Introduction
 to Computational Neuroscience
 PSYCH 3320/BIONB 3280 Biopsychology
 of Learning and Memory
 PSYCH/BIONB 3960 Introduction to
 Sensory Systems
 PSYCH 4250 Cognitive Neuroscience

5. Independent Study

With approval from the Cognitive Science undergraduate curriculum committee, a student and advisor in the Cognitive Science program can arrange their own unique collection of courses that do not belong to the above categories for satisfying the minor requirements.

COGST 4700 Undergraduate Research in
 Cognitive Studies
 COGST 4710 Cognitive Studies Research
 Workshop

A Cognitive Science undergraduate laboratory and computer facility (201 Uris Hall) is available for all students in a Cognitive Science minor. This facility will help link resources from different laboratories across the Cornell campus as well as providing a central location for developing and conducting experimental research in Cognitive Science.

Students who complete the minor requirements will have their minor in Cognitive Science officially represented on their transcript. In addition, students who have made substantial progress toward completing the requirements for the minor will be eligible for enrollment in the graduate courses in Cognitive Science during their senior year.

Minor Application Procedures. Initial inquiries concerning the undergraduate concentration should be made to the Cognitive Science Program coordinator, Julie

Simmons-Lynch, cogst@cornell.edu, 255-6431, who will provide application materials.

To formally initiate the minor in Cognitive Science, a student must gain approval for a selection of courses from a minor advisor (one of the program faculty). The courses selected must form a coherent cluster that makes sense to both the advisor and the student. To be admitted to the minor, the student must submit this plan of study to the Cognitive Science undergraduate faculty committee for final approval.

In addition to assisting in and approving the student's selection of courses, the minor advisor serves as a general source of information about the field of Cognitive Science, relevant resources around the university, and job and graduate school opportunities. Often, the advisor can help the student develop independent research experience.

Independent Research. The minor encourages each student to be involved in independent research that bears on research issues in Cognitive Science, if possible. COGST 4700 is available for this purpose. It is recommended that students report on their research activities in an annual undergraduate forum. The Undergraduate Minor Committee is committed to helping students find an appropriate research placement when needed.

The Committee for Undergraduate Minor in Cognitive Science consists of: Bart Selman, Computer Science, 255-5643, 4144 Upson Hall, selman@cs.cornell.edu; Draga Zec, linguistics, 255-0728, 217 Morrill Hall, dz17@cornell.edu; Morten Christiansen, psychology, 255-3570, 2380 Uris Hall, mhc27@cornell.edu. The current director of undergraduate studies is Draga Zec.

Graduate Minor

Entering graduate students, as well as advanced undergraduates, who are interested in cognition and in the cognitive sciences are advised to take the proseminar course COGST 6501 Introduction to Cognitive Science [not offered 2009-2010] in the fall semester. Enrolling in this 4-credit version of COGST 1101 involves a weekly section meeting with the instructor and will satisfy the introductory course requirement.

Graduate students minoring in Cognitive Science will take additional courses recommended by their graduate committee to complete their course requirements.

For more information, consult the program office (278G Uris Hall, 255-6431, cogst@cornell.edu) or the director of graduate studies, Morten Christiansen (255-3570, mhc27@cornell.edu).

Courses

Cognitive Science

COGST 1101 Introduction to Cognitive Science (also CS 1710, LING 1170, PHIL 1910, PSYCH 1102) (KCM-AS)

Fall. 3 or 4 credits; 4-credit option involves writing section instead of exams. Staff. Surveys the study of how the mind/brain works. Examines how intelligent information processing can arise from biological and artificial systems. Draws primarily from five disciplines that make major contributions to cognitive science: philosophy, psychology,

neuroscience, linguistics, and computer science. The first part of the course introduces the roles played by these disciplines in cognitive science. The second part focuses on how each of these disciplines contributes to the study of five topics in cognitive science: language, vision, learning and memory, action, and artificial intelligence.

COGST 1110 Brain, Mind, and Behavior (also BIONB/PSYCH 1110) (PBS)

Spring. 3 credits. Intended for freshmen and sophomores in humanities and social sciences; seniors not allowed. Not recommended for psychology majors; biology majors may not use course for credit toward major. Letter grades only. R. Hoy and E. Adkins Regan.

Understanding how the brain creates complex human behavior and mental life is a great scientific frontier of the next century. This course enables students with little scientific background from any college or major to appreciate the excitement. What are the interesting and important questions? How are researchers trying to answer them? What are they discovering? Why did the brain evolve this remarkable capacity?

COGST 1500 Intro to Human Environment Relations (also DEA 1500)

Spring. 3 credits. G. Evans.
For description, see DEA 1500.

COGST 2140 Cognitive Psychology (also PSYCH/INFO 2140/6140) (KCM-AS)

Spring. 4 credits. Limited to 200 students. Prerequisite: sophomore standing. Note: Undergraduates who want 5 credits also should enroll in COGST 6150. S. Edelman.
For description, see PSYCH 2140.

COGST 2150 Psychology of Language (also LING/PSYCH 2150) (KCM-AS)

Spring. 3 credits. Prerequisite: sophomore, junior, or senior standing; any one course in psychology or human development. M. Christiansen.
For description, see PSYCH 2150.

COGST 2300 Cognitive Development (also HD 2300)

Spring. 3 credits. Prerequisite: HD 1150 or PSYCH 1101. Q. Wang.

Designed to help students develop a broad understanding of the mechanisms, processes, and current issues in cognitive development and learn to do critical, in-depth analyses of developmental research. Discusses how children's thinking changes over the course of development and evaluate psychological theories and research on various aspects of cognitive development. Topics include perception, representation and concepts, reasoning and problem solving, social cognition, memory, metacognition, language and thought, and academic skills. Students also have hands-on research experiences with "real" kids.

COGST 2380 Thinking and Reasoning (also HD 2380)

Fall. 3 credits. Prerequisite: HD 1150 or PSYCH 1101. B. Koslowski.
Examines problem solving and transfer, precausal thinking, logical thinking, practical syllogisms, causal reasoning, scientific reasoning, theories of evidence, expert vs. novice differences, and nonrational reasoning. Two general issues run through the course: the extent to which children and adults approximate the sorts of reasoning that are

described by various types of models, and the extent to which various models accurately describe the kind of thinking that is required by the types of problems and issues that arise and must be dealt with in the real world.

COGST 3300 Introduction to Computational Neuroscience (also BIONB 2330/PSYCH 3300) (PBS)

Fall. 3-4 credits; 4-credit option includes lab providing additional computer simulation exercises. Limited to 25 students. Prerequisite: BIONB 2220 or permission of instructor. C. Linster.
For description, see BIONB 2330.

COGST 3330 Problems in Semantics—Quantification in Natural Language (also LING 3333, PHIL 3700) (KCM-AS)

Spring. 4 credits. Prerequisites: course in logic or semantics or permission of instructor. D. Abusch.
For description, see LING 3333.

COGST 3340 The Growth of the Mind (also HD 3340) (KCM-AS)

Spring. 4 credits. Prerequisite: course in human experimental psychology, cognitive psychology, statistics, HD 1150, or equivalent, or permission of instructor. Primarily intended for sophomores through seniors. B. Lust.

The fundamental issues of cognition are introduced in this course. What is the nature of human intelligence? Of logical and scientific reasoning? How are knowledge and understanding acquired and represented in the human mind? What is the nature of mental representation? What are the cognitive characteristics of the mind at birth? What is the relation of the acquisition of knowledge and understanding to their final representation? What are the relations between language and thought? In the study of those issues, how can epistemology and experimental psychology be related through the experimental method? Basic debates within the study of cognition are introduced and discussed throughout. The course will analyze Piaget's comprehensive theory of cognitive development and experimental results. Current research in cognitive development will be contrasted.

COGST 3370 Language Development (also HD 3370, LING 4436, PSYCH 4360) (KCM-AS)

Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HD 6330 or LING 7700, a supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. S-U or letter grades. B. Lust.
Surveys basic issues, methods, and research in the study of first-language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental linguistic issues of "Universal Grammar" and the biological foundations for acquisition are discussed, as are the issues of relations between language and thought. The acquisition of communication systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child. An optional lab course supplement is available (see COGST 4500/HD 4370/LING 4500/PSYCH 4370).

COGST 3420 Human Perception: Applications to Computer Graphics, Art, and Visual Display (also PSYCH 3420/6420, VISST 3342)

Fall. 3 or 4 credits; 4-credit option involves term paper. Prerequisite: PSYCH 1101 or permission of instructor. Highly recommended: PSYCH 2050. D. Field.

Our present technology allows us to transmit and display information through a variety of media. To make the most of these media channels, it is important to consider the limitations and abilities of the human observer. The course considers a number of applied aspects of human perception with an emphasis on the display of visual information. Topics include "three-dimensional" display systems, color theory, spatial and temporal limitations of the visual systems, attempts at subliminal communication, and "visual" effects in film and television.

[COGST 4120 Laboratory in Cognition and Perception (III) (also PSYCH 4120) (KCM-AS)

Spring. 4 credits. Limited to 15 students. Prerequisite: statistics and one course in cognition or perception recommended. Graduate students, see PSYCH 6120. Next offered 2010–2011. D. J. Field.

Laboratory course designed to introduce students to experimental methods in perception and cognitive psychology. Students take part in a number of classic experiments and develop at least one independent project. Computers are available and used in many of the experiments although computer literacy is not required. Projects are selected from the areas of visual perception, pattern recognition, memory, and concept learning.]

COGST 4240 Computational Linguistics (also CS 3470, LING 4424) (MQR)

Fall. 4 credits. Recommended: CS 2006. Labs involve work in Unix environment. J. Hale.

For description, see LING 4424.

[COGST 4260 Learning Language (also PSYCH 4260/7260) (KCM-AS)

Spring. 4 credits. Limited to 20 students. Prerequisite: PSYCH 2140 or by permission of the instructor. Next offered 2010–2011. S. Edelman.

For description, see PSYCH 4260.]

COGST 4270 Evolution of Language (also PSYCH 4270/6270)

Fall. 3 credits. Limited to 20 students. Prerequisite: senior standing or permission of instructor. Offered alternate years. M. Christiansen.

For description, see PSYCH 4270.

[COGST 4280 Connectionist Psycholinguistics (also LING 4428, PSYCH 4280/6280)

Fall. 3 credits. Prerequisite: senior standing or permission of instructor. Offered alternate years; next offered 2010–2011. M. Christiansen.

For description, see PSYCH 4280.]

COGST 4310 Consciousness and Free Will (also BIONB 4330, PSYCH 4320)

Spring. 4 credits. Prerequisite: PSYCH/COGST/INFO 2140/6140. S. Edelman.

This advanced course builds on the foundations of the computational understanding of the human mind provided by PSYCH 2140 (Cognitive Psychology). It covers consciousness, free will, ethics, wisdom, and happiness through a

combination of readings (which include a textbook, research articles, and short stories by Borges), lectures, and in-class discussions. For details, see the instructor's web page.

COGST 4320 Cognitive, Social, and Developmental Aspects of Scientific Reasoning (also HD 4320)

Fall. 3 credits. Prerequisites: HD 1150 or PSYCH 1101. Offered alternate years. B. Koslowski.

For description, see HD 4320.

COGST 4330 Developmental Cognitive Neuroscience (also HD 4330)

Spring. 3 credits. Limited to 25 students. Prerequisite: HD 1150 or PSYCH 1101 and one semester of biology; permission of instructor.

For description, see HD 4330.

COGST 4340 Current Topics in Cognitive Development (also HD 4240) (KCM-AS)

Spring. 3 credits. Corequisite: COGST/HD 2340; permission of instructor. Offered alternate years.

The course will supplement survey course HD/COGST 3340 with additional discussion of current research in the area of cognitive development. Selected current papers will be read and discussed in parallel with the HD/COGST 3340 survey course. Modern interpretations and challenges to Piaget's theory will be evaluated in light of current literature in the field. A small group format will be adopted to encourage discussion.

COGST 4350 Mind, Self, and Emotion: Research Seminar (also HD 4310)

Fall. 3 credits. Limited to 20 students. Prerequisite: upperclass undergraduate or graduate standing. Letter grades only. Q. Wang.

Examines current data and theory concerning memory, self, and emotion from a variety of perspectives and at multiple levels of analysis, particularly focusing on the interconnections among these fields of inquiry. A special emphasis is given to cross-cultural studies on memory development, self-construal, and conception of emotion.

[COGST 4500 Lab Course: Language Development (also HD/PSYCH 4370, LING 4500)

Fall. 2 credits. In conjunction with COGST/HD/LING/PSYCH 4370. Next offered 2010–2011. B. Lust.

Optional supplement to the survey course Language Development (COGST/HD/LING/PSYCH 4370). The lab course provides students with a hands-on introduction to scientific research, including design and methods, in the area of first-language acquisition.]

COGST 4520 Culture and Human Development (also AAS/HD 4520) (CA-AS)

Fall. 3 credits. Limited to 30 students. Prerequisite: HD 1150 or PSYCH 1101. Q. Wang.

Takes an interdisciplinary approach to address the central role of culture in human development. Draws on diverse theoretical perspectives, including psychology, anthropology, education, ethnography, and linguistics, to understand human difference, experience, and complexity. Empirical reflections are taken upon major developmental topics such as cultural aspects of physical growth and development; culture

and cognition; culture and language; culture, self, and personality; cultural construction of emotion; culture issues of sex and gender; and cultural differences in pathology.

COGST 4650 Topics in High-Level Vision: Embodied Cognition (also PSYCH 4650/6650) (KCM-AS)

Spring. 4 credits. S. Edelman and M. Goldstein.

For description, see PSYCH 4650.

COGST 4700 Undergraduate Research in Cognitive Science

Fall or spring. 1–4 credits. Prerequisite: permission of major advisor; written permission of Cognitive Science faculty member who supervises research and assigns grade. S–U or letter grades. Cognitive Science faculty.

Experience in planning, conducting, and reporting independent laboratory, field, and/or library research in an interdisciplinary area relevant to Cognitive Science.

COGST 4710 Cognitive Science Research Workshop

Fall or spring. Variable credit. Prerequisites: enrollment in an independent research course either in Cognitive Science (e.g., COGST 4700) or in a related department or in honors thesis research in one of the departments relevant to Cognitive Science. Staff (interdisciplinary faculty from Cognitive Science Program).

Provides a research workshop in which undergraduate students who are engaged in research in a particular area relevant to cognitive science can meet across disciplines to learn and practice the essentials of research using interdisciplinary approaches. In this workshop, students critique and discuss the existing literature in a field of inquiry, individual students present their research designs, methods, and results from their independent research studies, debate the interpretation of their research results, and participate in the generation of new research hypotheses and designs, in a peer group of other undergraduate students involved in related research.

COGST 4740 Introduction to Natural Language Processing (also CS 4740, LING 4474)

Fall or spring. 4 credits. Prerequisite: CS 2110. C. Cardie.

For description, see CS 4740.

COGST 4760–4770 Decision Theory I and II (also COGST/ECON 6760–6770, ECON 4760–4770) (MQR)

Fall and spring. 4 credits each semester. In fall, course is lecture based. Students are required to complete several problem sets and there is a final exam. In spring, there are additional lectures as well as visiting speakers. Students are required to read speakers' papers, participate in discussions, and complete a research project. L. Blume, D. Easley, and J. Halpern.

Research on decision theory resides in a variety of disciplines including computer science, economics, game theory, philosophy, and psychology. This new course attempts to integrate these various approaches. The course is taught jointly by two economists/game theorists and a computer scientist. The course covers several areas: (1) basic decision theory. This theory, sometimes known as "rational choice theory," is part of the foundation for the disciplines listed above. It applies to decisions

made by individuals or by machines. (2) the limitations of and problems with this theory. Issues discussed here include decision theory paradoxes revealed by experiments, cognitive and knowledge limitations, and computational issues. (3) new research designed in response to these difficulties. Issues covered include alternative approaches to the foundations of decision theory, adaptive behavior, and shaping the individual decisions by aggregate/evolutionary forces.

COGST 4910 Research Methods in Psychology (also COGST 6910, PSYCH 4910/6910)

Spring. 4 credits. Limited to 15 students. Recommended: permission of instructor, PSYCH 3500, experience in upper-division psychology courses, or graduate standing. Graduate students, see COGST 6910. V. Zayas.

For description, see PSYCH 4910.

Computer Science

CS 1710 Introduction to Cognitive Science (also COGST 1101, LING 1170, PHIL 1910, PSYCH 1102)

Fall. 3 or 4 credits. Staff.

CS 2110 Computers and Programming

Fall, spring, or summer. 3 credits.

CS 3110 Data Structures and Functional Programming

Fall or spring. 4 credits.

CS 3470 Computational Linguistics (also COGST 4240, LING 4424)

Fall. 4 credits. M. Rooth.

CS 3810 Introduction to Theory of Computing

Fall, summer. 4 credits.

CS 4700 Foundations of Artificial Intelligence

Fall. 3 credits. T. Joachims.

CS 4701 Practicum in Artificial Intelligence

Fall. 2 credits. T. Joachims.

CS 4740 Introduction to Natural Language Processing (also COGST 4740, LING 4474)

Fall. 4 credits. M. Rooth.

CS 4780 Machine Learning

Spring. 3 credits.

CS 4860 Applied Logic (also MATH 4860)

Spring. 4 credits.

Education (College of Agriculture and Life Sciences)

EDUC 6140 Gender, Context, and Epistemological Development

Fall. 3 credits. D. Schrader.

Human Development (College of Human Ecology)

HD 1150 Human Development

Fall or summer. 3 credits.

[HD 2200 The Human Brain and Mind: Biological Issues in Human Development (also COGST 2200)]

Fall. 3 credits. Next offered 2010-2011.]

HD 2300 Cognitive Development (also COGST 2300)

Spring. 3 credits. Q. Wang.

HD 2380 Thinking and Reasoning (also COGST 2380)

Fall. 3 credits. B. Koslowski.

HD 2660 Emotional Functions of the Brain

Spring. 3 credits.

HD 3200 Human Developmental Neuropsychology

Spring. 3 credits. B. Koslowski.

HD 3360 Connecting Social, Cognitive, and Emotional Development

Fall. 3 credits. M. Casasola.

HD 3370 Language Development (also COGST/PSYCH 3370, LING 4436)

Spring. 4 credits. B. Lust.

HD 3440 Infant Behavior and Development

Fall. 3 credits. S. Robertson.

HD 3470 Human Growth and Development: Biological and Behavioral Interactions (also BSOC/NS 3470)

Spring. 3 credits. S. Robertson and J. Haas.

HD 3620 Human Bonding

Fall. 3 credits.

HD 4310 Mind, Self, and Emotion: Research Seminar (also COGST 4350)

Fall. 3 credits. Q. Wang.

HD 4320 Cognitive, Social, and Developmental Aspects of Scientific Reasoning (also COGST 4320)

Fall. 3 credits. B. Koslowski.

HD 4330 Developmental Cognitive Neuroscience (also COGST 4330)

Spring. 3 credits. E. Temple.

HD 4370 Lab Course: Language Development (also COGST/LING 4450, PSYCH 4370)

Spring. 2 credits. In conjunction with HD 3370, COGST/LING/PSYCH 4360. B. Lust.

HD 4520 Culture and Human Development (also AAS/COGST 4520)

Fall. 3 credits. Q. Wang.

Linguistics

LING 1170 Introduction to Cognitive Science (also COGST 1101, CS 1710, PHIL 1910, PSYCH 1102)

Fall. 3 or 4 credits. Staff.

LING 2215 Psychology of Language (also COGST 2150, LING 7715, PSYCH 2150/7150)

Spring. 3 credits. M. Christiansen.

LING 3332 Philosophy of Language (also PHIL 3320)

Fall. 4 credits. Staff.

LING 3333 Problems in Semantics—Quantification in Natural Language (also COGST/PHIL 3330)

Spring. 4 credits.

LING 4424 Computational Linguistics (also COGST 4240, CS 3470)

Fall. 4 credits. M. Rooth.

LING 4425 Pragmatics

Spring. 4 credits.

[LING 4428 Connectionist Psycholinguistics (also COGST 4280, LING 6628, PSYCH 4280/6280)]

Fall. 3 credits. Offered alternate years; next offered 2010-2011. M. Christiansen.]

LING 4436 Language Development (also COGST/HD/PSYCH 4360)

Fall. 4 credits. B. Lust.

LING 4474 Introduction to Natural Language Processing (also COGST/CS 4740)

Fall. 4 credits. L. Lee.

LING 4500 Lab Course: Language Development (also COGST 4500, HD/PSYCH 4370)

Fall. 2 credits. In conjunction with COGST/HD/LING/PSYCH 4360. B. Lust.

Mathematics

[MATH 2810 Deductive Logic (also PHIL 3310)]

MATH 4810 Mathematical Logic (also PHIL 4310)

Spring. 4 credits. Offered alternate years.

MATH 4860 Applied Logic (also CS 4860)

Spring. 4 credits.

Neurobiology and Behavior

BIONB 1110 Brain, Mind, and Behavior (also COGST/PSYCH 1110)

Spring. 3 credits. R. Hoy and E. Adkins Regan.

BIONB 2210 Neurobiology and Behavior I: Introduction to Behavior

Fall. 3 or 4 credits.

BIONB 2220 Neurobiology and Behavior II: Introduction to Neurobiology

Spring. 3 or 4 credits.

BIONB 3260 The Visual System

Spring. 4 credits. H. Howland.

BIONB 3280 Biopsychology of Learning and Memory (also PSYCH 3320)

Spring. 3 credits. T. DeVoogd.

BIONB 3330 Introduction to Computational Neuroscience (also COGST/PSYCH 3300)

Fall. 3-4 credits. C. Linster.

BIONB 3920 Drugs and the Brain

Spring. 4 credits. R. Harris-Warrick and L. M. Nowak.

BIONB 3960 Introduction to Sensory Systems (also PSYCH 3960)

Spring. 3 or 4 credits. B. Halpern.

BIONB 4210 Effects of Aging on Sensory and Perceptual Systems (also PSYCH 4310/6310)

Fall. 3 or 4 credits. B. Halpern.

BIONB 4240 Neuroethology (also PSYCH 4240)

Spring. 4 credits.

BIONB 4260 Animal Communication

Spring. 4 credits.

BIONB 4920 Sensory Function (also PSYCH 4920/6920, VISST 4920)

Spring. 3 or 4 credits. H. Howland.

BIONB 4960 Bioacoustic Signals in Animals and Man

Fall. 3 credits. C. Clark and R. Hoy.

Philosophy

PHIL 2620 Introduction to Philosophy of Mind
Fall. 4 credits.

PHIL 4310 Mathematical Logic (also MATH 4810)

Psychology

PSYCH 1102 Introduction to Cognitive Science (also COGST/CS 1101, LING 1170, PHIL 1910)
Fall. 3 or 4 credits. Staff.

PSYCH 1110 Brain, Mind, and Behavior (also BIONB 1111, COGST 1110)
Spring. 3 credits. R. Hoy and E. Adkins Regan.

PSYCH 2050 Perception (also PSYCH 6050)
Fall. 3 credits. J. Cutting.

PSYCH 2090 Developmental Psychology (also PSYCH 7090)
Spring. 4 credits. M. Goldstein.

PSYCH 2140 Cognitive Psychology (also COGST 2140)
Spring. 3 credits. S. Edelman.

PSYCH 2150 Psychology of Language (also COGST 2150, LING 2215/7715, PSYCH 7150)
Spring. 3 credits. M. Christiansen.

PSYCH 2230 Introduction to Biopsychology
Fall. 3 credits. D. Smith.

PSYCH 3050 Visual Perception (also VISST 3305)
Spring. 4 credits. J. Cutting.

PSYCH 3160 Auditory Perception (also PSYCH 7160)
Spring. 3 or 4 credits. C. Krumhansl.

PSYCH 3260 Evolution of Human Behavior (also PSYCH 6260)
Spring. 4 credits. R. Johnston.

PSYCH 3300 Introduction to Computational Neuroscience (also BIONB/COGST 3300)
Fall. 3–4 credits. C. Linster.

PSYCH 3320 Biopsychology of Learning and Memory (also BIONB 3280, PSYCH 6320)
Spring. 3 credits. T. DeVoogd.

PSYCH 3420 Human Perception: Applications to Computer Graphics, Art, and Visual Display (also COGST 3420, PSYCH 6420, VISST 3342)
Fall. 3 or 4 credits. D. Field.

PSYCH 3610 Biopsychology of Normal and Abnormal Behavior (also NS 3610)
Fall. 3 credits. B. J. Strupp.

[PSYCH 3960 Introduction to Sensory Systems (also BIONB 3960, PSYCH 6960)
Spring. 3 or 4 credits. Next offered 2011–2012. B. Halpern.]

PSYCH 4120 Laboratory in Cognition and Perception (also PSYCH 6121)
Spring. 4 credits. D. Field.

PSYCH 4180 Psychology of Music (also PSYCH 6180)
Fall. 3 or 4 credits. C. Krumhansl.

PSYCH 4240 Neuroethology (also BIONB 4240)
Spring. 4 credits. C. D. Hopkins.

[PSYCH 4250 Cognitive Neuroscience (also PSYCH 6250)
Fall. 4 credits. Next offered 2010–2011. B. Finlay.]

PSYCH 4260 Learning Language
Spring. 4 credits. S. Edelman. Next offered 2010–2011.]

PSYCH 4270 Evolution of Language (also COGST 4270, PSYCH 6270)
Fall. 3 credits. Offered alternate years. M. Christiansen.

[PSYCH 4280 Connectionist Psycholinguistics (also COGST 4280, LING 4428/6628, PSYCH 6280)
Fall. 3 credits. Offered alternate years; next offered 2010–2011. M. Christiansen.]

PSYCH 4310 Effects of Aging on Sensory and Perceptual Systems (also BIONB 4210, PSYCH 6310)
Fall. 3 or 4 credits. B. Halpern.

PSYCH 4360 Language Development (also COGST/HD 4360, LING 4436)
Spring. 4 credits. B. Lust.

PSYCH 4370 Lab Course: Language Development (also COGST/LING 4500, HD 4370)
Fall. 2 credits. In conjunction with COGST/HD/LING/PSYCH 4360. B. Lust.

PSYCH 4650 Topics in High-Level Vision: Embodied Cognition (also COGST 4650, CS 3920, PSYCH 6655)
Spring. 4 credits. Offered alternate years. S. Edelman and M. Goldstein.

PSYCH 4910 Research Methods in Psychology (also COGST 4910/6910, PSYCH 6910)
Spring. 4 credits. V. Zayas.

[PSYCH 4920 Sensory Function (also BIONB/VISST 4920, PSYCH 6920)
Spring. 4 credits. Next offered 2012–2013. B. Halpern and H. Howland.]

Graduate Courses and Seminars

The following courses and seminars are generally for graduate students only. However, some may be appropriate for advanced undergraduates. The director of the minor must approve an undergraduate's use of any of these for satisfying the minor requirements.

[COGST 4300 Structure in Vision and Language (also PSYCH 6301)
Spring. 4 credits. Limited to 20 students. Graduate seminar. Prerequisites: graduate standing or undergraduates by permission of instructor; one course each in cognitive psychology, linguistics, and computer science, or permission of instructor. Offered alternate years; next offered 2010–2011. S. Edelman.]

[COGST 5500 Special Topics in Cognitive Science
Fall. 4 credits. Next offered 2010–2011. Staff.]

COGST 6140 Cognitive Psychology (also PSYCH 6140)

Spring. 3 credits. Includes lec of COGST/PSYCH 2140 and a sec. S. Edelman. Introduces the idea of cognition as information processing, or computation, using examples from perception, attention and consciousness, memory, language, and thinking. Participants acquire conceptual tools that are essential for following the current thought on the nature of mind and its relationship to the brain.

COGST 6330 Language Acquisition Seminar (also HD/LING 6633)
Fall. 1–4 credits. Prerequisite: COGST/HD/LING/PSYCH 4360 or equivalent, or permission of instructor. B. Lust.

Reviews and critiques current theoretical and experimental studies of first-language acquisition, with a concentration on insights gained by cross-linguistic study of this area. Attention is also given to the development of research proposals.

[COGST 6501 Introduction to Cognitive Science, Proseminar
Fall. 4 credits. Next offered 2010–2011. Staff.

COGST 6501 surveys the study of how the mind/brain works, drawing primarily from five disciplines: philosophy, psychology, neuroscience, linguistics, and computer science. Graduate students will observe the Tuesday/Thursday lectures for COGST 1101 and attend a weekly discussion section.]

COGST 6710 Introduction to Automated Reasoning (also CS 6762)
Fall. 4 credits. Prerequisite: (CS 6110 and graduate standing) or permission of instructor.

Topics in modern logic needed to understand and use automated reasoning systems such as HOL, Nuprl, and PVS. Special emphasis is on type theory and logic and on tactic-oriented theorem proving.

COGST 6760–6770 Decision Theory (also COGST 4760–4770, CS 5846–5847, ECON 4460–4470/6760–6770)

Fall and spring. 4 credits each semester. Fall: lecture-based; students must complete several problem sets and a final exam. Spring: additional lectures as well as visiting speakers; students must read speakers' papers, participate in discussions, and complete a research project. L. Blume, D. Easley, and J. Halpern. For description, see COGST 4760–4770.

COGST 6910 Research Methods in Psychology (also COGST 4910, PSYCH 4910/6910)

Spring. 4 credits. Limited to 15 students. V. Zayas. Intensive examination of the basic research methods used in social, personality, cognitive, and developmental psychology. Focuses on designing and conducting experiments, i.e., how to turn vague theories into concrete and testable notions, evaluate studies, avoid common pitfalls, and, finally, remain ethical. The course, in addition, covers test construction, survey methods, and "quasi experiments." Students concentrate on completing a small research project in which they conduct an experiment, interpret its data, and write up the results.

COGST 7000 First-Language Acquisition (also HD 6370)

Spring. 1-4 credits. Prerequisites: COGST/HD/LING/PSYCH 3370 and permission of instructor. B. Lust.

For description, see HD 6370.

COGST 7100 Research in Human Experimental Psychology (also PSYCH 7100)

Fall or spring. Credit TBA. Prerequisite: permission of instructor.

CS 6670 Machine Vision

Spring. 4 credits. R. Zabih.

CS 6700 Advanced Artificial Intelligence

Spring. 4 credits. Prerequisite: CS 4700.

CS 6740 Natural Language Processing

Fall. 4 credits. Prerequisite: CS 4700. Not offered every year.

CS 6762 Introduction to Automated Reasoning (also COGST 6710)

Fall. 4 credits.

CS 6764 Reasoning about Knowledge

Fall. 4 credits. Prerequisites: mathematical maturity and acquaintance with propositional logic.

CS 6766 Reasoning about Uncertainty

Fall. 4 credits. Prerequisites: mathematical maturity and acquaintance with propositional logic.

CS 7794 Seminar in Natural Language Understanding

Fall and spring. 2 credits. C. Cardie.

CS 7970 Seminar in Artificial Intelligence

Fall and spring. 2 credits.

EDUC 6140 Gender, Context, and Epistemological Development (also FGSS 6240)

Fall. 3 credits. D. Schrader.

HD 6330 Language Acquisition Seminar (also COGST/LING 6633)

Fall. 1-4 credits. Prerequisite: COGST/HD/LING/PSYCH 4360 or equivalent. B. Lust.

[LING 6609 Second Language Acquisition and the Asian Languages (also ASIAN 6610)]

Fall. 4 credits. Prerequisite: LING 4414-4415. Next offered 2010-2011. Y. Shirai.]

LING 6633 Language Acquisition Seminar (also COGST/HD 6330)

Fall. 1-4 credits. Prerequisite: COGST/HD/LING/PSYCH 4360 or equivalent. B. Lust.

LING 6688 Connectionist Psycholinguistics (also COGST/LING 4428, PSYCH 4280/6280)

Fall. 3 credits. Offered alternate years. M. Christiansen.

LING 7700 Graduate Seminars**MATH 6810 Logic**

Spring. 4 credits.

MATH 7810-7820 Seminar in Logic

Fall and spring. 4 credits each.

MATH 7880 Topics in Applied Logic

Fall. 4 credits.

NBA 6630 Managerial Decision Making

Fall. 3 credits. J. Russo.

PHIL 7000 Graduate Seminars**[PSYCH 5500 Special Topics in Cognitive Science (also COGST 5500)]**

Spring. 4 credits. Next offered 2010-2011.]

PSYCH 6140 Cognitive Psychology (also COGST 6140)

Spring. 5 credits. S. Edelman.

PSYCH 6180 Psychology of Music (also PSYCH 4180)

Fall. 4 credits. C. Krumhansl.

PSYCH 6210 Behavioral and Brain Sciences (BBS)

Fall and spring. 4 credits each semester.

PSYCH 6270 Evolution of Language**[PSYCH 6280 Connectionist Psycholinguistics (also COGST/PSYCH 4280, LING 4428/6628)]**

Fall. 3 credits. Next offered 2010-2011. M. Christiansen.]

PSYCH 6310 Effects of Aging on Sensory and Perceptual Systems (also BIONB 4210, PSYCH 4310)

Fall. 3 or 4 credits. B. Halpern.

PSYCH 6650 Topics in High-Level Vision: Embodied Cognition (also COGST/PSYCH 4650, CS 3920)

Spring. 4 credits. S. Edelman and M. Goldstein.

PSYCH 6830 Affects and Cognition (also NRE 5070)

Fall. 4 credits. A. M. Isen.

PSYCH 6910 Research Methods in Psychology (also COGST 4910/6910, PSYCH 4910)

Spring. 4 credits. V. Zayas.

PSYCH 7160 Auditory Perception (also PSYCH 3160)

Spring. 4 credits. C. Krumhansl.

COLLEGE SCHOLAR PROGRAM

K. Gabard, director (55 Goldwin Smith Hall, 255-5792)

The College Scholar Program is described in the introductory section of Arts and Sciences.

COLLS 3970 Independent Study—Senior Project

Fall or spring. 1-4 credits. Prerequisite: permission of program office.

COLLS 4990 Honors Research

Fall or spring. 1-8 credits; max. 8 credits may be earned for honors research. Prerequisite: permission of program director. Each participant must submit brief proposal approved by honors committee.

COMPARATIVE LITERATURE

N. Saccamano, chair (247 Goldwin Smith Hall), N. Melas, director of undergraduate studies (247 Goldwin Smith Hall); J. Monroe, director of graduate studies (247 Goldwin Smith Hall); F. Ahl, A. Banerjee, C. Carmichael, D. Castillo, C. Chase, W. Cohen, J. Culler, B. de Bary, L. Dubreuil, L. Ferri, P. Hohendahl, G. Holst-Warhaft, W. J. Kennedy, D. LaCapra, P. Liu, B. Maxwell, T. McNulty, N. Melas, J. Monroe, T. Murray, N. Saccamano, N. Sakai, W. Sayers. Emeritus: D. Grossvogel, W. Holdheim, E. Rosenberg, L. Waugh. Also cooperating: G. Arching, C. Boyce Davies, T. Campbell, M. I. Dadi, P. Gilgen, E. Hanson, R. Mas, B. Massumi, P. McBride, C. Robics, D. Rubenstein, A. Schwarz, D. Schwarz, D. Starr, S. Toorawa, G. Waite, A. Weiner, H. Yan.

The Department of Comparative Literature provides a broad range of courses in European and non-European literature as well as visual and media studies. Courses stress significant authors, themes, problems, styles, genres, historical periods, and theoretical perspectives. In cooperation with related departments in the humanities, the departmental offerings reflect current interdisciplinary approaches to literary study: hermeneutics, semiotics, deconstruction, cultural criticism, Marxism, reception aesthetics, feminism, and psychoanalysis.

The Major

The Department of Comparative Literature provides a broad range of courses in European as well as non-European literatures. Courses devoted to literary studies variously stress significant authors, themes, problems, genres, historical periods, and theoretical perspectives. The Department also offers an array of courses in visual and media studies and enables the study of literature in relation to the history and theory of film, video, and other arts, as well as media. In cooperation with related departments in the humanities, the department encourages the interdisciplinary study of literature—in conjunction with anthropology, history, philosophy, sexuality studies, psychology, sociology, and so forth. The course offerings reflect current theoretical approaches to literature, media, and the arts—hermeneutics, semiotics, deconstruction, cultural criticism, Marxism, postcolonialism, reception aesthetics, feminism, and psychoanalysis.

Requirements for the Major

All majors in Comparative Literature are expected to have completed 10 courses, half of which must be devoted to the study of works in cultures other than English in their original languages.

Five of these courses must be taken in the Department of Comparative Literature. One of these must be a Core Course, to be taken in the junior or the senior year. The designated core courses change each semester (for 2009-2010, COML 4220 [fall], COML 4020 [spring]).

Students must earn a minimum grade of C for a course to be counted toward the major. If elected, an honors essay will also count as one of these required five courses.

An honors essay (COML 4930 [fall], COML 4940 [spring]) of roughly 50 pages is optional. It is to be written during the senior year under the direction of a faculty member, preferably from within the department, who has agreed to work in close cooperation with the student. Students are urged to begin research on their

thesis topic during the summer preceding their senior year.

Students who elect to do a double major with another literature department may count up to three courses from that major toward their requirements in Comparative Literature.

The department encourages students to study abroad in pursuit of their cultural and linguistic interests, and the number of courses that may be counted toward the major will be determined in consultation with the faculty advisor and with the approval of the director of undergraduate studies.

The major enables students to pursue this commitment to a comparative study that includes a substantial non-English component by offering two tracks.

- A. **Comparative Literary Studies.** This track is designed for students who wish to place greater emphasis on literary study in their course work. Students who select this track are required to complete:
1. Five courses in Comparative Literature at the 2000 level and above.
 2. Five courses in literature or other areas of the humanities at the 2000 or higher level, to be taken in one or more foreign literature departments. Texts must be read in the original language. A student may offer one advanced-level foreign language course (conversation, composition, etc.) toward fulfilling this requirement.
- B. **Literary, Visual, and Media Studies.** This track is designed for students who wish to pursue their comparative study of literature and theory by integrating rigorous work on film, video, or other arts and media. Students who select this track are required to complete:
1. Four courses in literary study at the 2000 or higher level offered by the Department of Comparative Literature or other humanities departments or programs.
 2. Six courses in visual arts or media studies at the 2000 or higher level offered by the Department of Comparative Literature or other humanities departments or programs.

The following guidelines might be used to determine whether a course in Literary, Visual, and Media Studies may be counted toward the five courses in non-English cultural study required of all majors. Where the media involve a large component of speech or writing (such as film, video, or hypertext), the student would need to work with this material in the original foreign language. Where text or speech in a foreign language is peripheral in a course that focuses on visual material (such as art or architecture) from non-English cultures, the student would need to draw on primary and secondary materials in a foreign language for oral reports, papers, and so forth. Because of the flexibility and interdisciplinary range of this track, students who select it should work closely with their faculty advisor to organize a coherent plan of study and to determine, with the approval of the Director of Undergraduate Studies, which courses satisfy the foreign language requirement of the major.

Honors

A student who completes the requirements for the major with a minimum grade point average of B+ is eligible for the degree of bachelor of arts with honors in Comparative Literature. The department bases its decision on the students achieving grades of at least B+ on the senior essay, in course work for the major, and in their overall academic performance at Cornell.

First-Year Writing Seminars

Most 1000-level courses may be used toward satisfying the first-year writing seminar requirements. See "John S. Knight Institute for Writing in the Disciplines" for a full description of the first-year seminar program.

Courses

COML 2000 Introduction to Visual Studies (also ENGL 2920, VISST/ARTH 2000) (LA-AS)

Spring. 4 credits. M. I. Dadi.
For description, see VISST 2000.

[COML 2010 Great Books # (LA-AS)

Fall. 4 credits. COML 2010 and 2020 may be taken independently of each other.
Next offered 2010–2011. Staff.]

COML 2020 Great Books (LA-AS)

Spring. 4 credits. A. Banerjee.
The course traces the evolution of the story of the road as theme, trope, and organizing principle of seminal books from the Renaissance to the postmodern. Through readings of Rabelais, Cervantes, Swift, Sterne, Twain, Gogol, Conrad, Hemingway, Nabokov, and Kerouac, we will explore how literary adventures structure our experience of the world.

COML 2030 Introduction to Comparative Literature (LA-AS)

Spring. 4 credits. P. Liu.
The course is intended to answer the question persistently asked by undergraduates: "What is Comparative Literature, anyway?" We will learn about different approaches to Comparative Literature and study the literatures of five different national/historical traditions: (Kafka, Faulkner, Lu Xun, Plautus, and Murakami). We will also read philosophical writings and works of literary criticism and ask three questions: (1) Why do Comparatists want to learn foreign languages and work with texts in the original? (2) How do we compare cultures and texts? (3) Is there such a thing as "world literature"? Writing assignments will include critical essays, short response papers, and creative projects.

COML 2040 Global Fictions (CA-AS)

Spring. 4 credits. N. Melas.
This course will be an introduction and an inquiry into global perspectives on fiction. Can the reading of fiction point us toward becoming citizens of the world? How might we know this world? How might we imagine it? We will consider the condition of the stranger in this global era as well as construct a geography of reading. Readings will be drawn mainly but not only from the contemporary period and outside Europe. Readings will change depending on instructor but may include works of Rushdie, Marquez, Conde, Munif, Castellanos, Oe, Ngugi, Wolf, Kincaid, and Homer.

[COML 2050 Introduction to Poetry (LA-AS)

Fall. 4 credits. Next offered 2010–2011.
W. J. Kennedy.]

[COML 2150 Comparative American Literatures (also AMST 2150) (LA-AS)

Fall. 4 credits. Next offered 2011–2012.
B. Maxwell.]

COML 2200 Thinking Surrealisms (also ARTH 2019, VISST 2190) (LA-AS)

Fall. 4 credits. B. Maxwell.
Borrowing its title from a formulation of the Marxist philosopher Ernst Bloch, and beginning from the "forays of demoralization" instigated by the Dadas, who bequeathed to surrealism the precious gift of unreconciliation to the given, this course will range over the protean expressiveness of several surrealist movements of the last century. The inception of surrealist precept and practice in Paris in the mid-1920s will be a consideration, perhaps only slightly more central to the course than the explicitly anti-fascist political phase of the 1930s and 40s; the supplementation of Parisian surrealism by Caribbean, Mexican, African American, Quebecois, and Mauritian writers and artists; the renegade practice of Hans Bellmer and the unschooled surreality of Eugene Atget; the reflections of and on surrealism by Walter Benjamin, Ernst Bloch, and Theodor W. Adorno; the relations of surrealism to the Situationist International; and the recent critiques of surrealism in fiction (Milan Kundera) and scholarship (Hal Foster). Throughout, the course will ask what the proliferation of "thinking surrealisms" meant to 20th-century culture and politics. All readings in English.

COML 2270 Life and Love in Two Languages (LA-AS)

Fall. 4 credits. N. Melas.
The course explores the multiple and fragmented worlds of the increasing number of those who speak, write, or live in more than one language. Examining a range of scholarship on bilingualism and multilingualism as well as multilingual fiction and film—from works written in second or third languages, to texts written in interlects between dominant and subjugated languages, to immigrant texts written between languages—we will study the limits and possibilities of multilingualism within particular texts, even as we survey more broadly the fate of multiple languages in this rapidly globalizing world. Authors range from canonical figures such as Joseph Conrad and Franz Kafka, and Chinua Achebe, to contemporary authors such as Luc Sante, Yoko Tawada, and Edwidge Danticat. All texts read in translation.

COML 2330 Origins of the Social (also HIST 2330) (HA-AS)

Spring. 4 credits. C. Robics.
For description, see HIST 2330.

COML 2728 Introduction to Modern Middle Eastern Literature (also NES 2728)

Spring. 3 credits. D. Starr.
For description, see NES 2728.

COML 2754 Introduction to Near Eastern Civilizations: The Literature of Prophets, Princes, and Poets (also NES 2754) @ # (LA-AS)

Fall. 3 credits. S. Toorawa.
For description, see NES 2754.

[COML 3020 Literature and Theory (also ENGL 3020) (LA-AS)

Fall. 4 credits. Next offered 2010–2011.
J. Culler.
For description, see ENGL 3020.]

[COML 3040 Europe and Its Others: An Introduction to the Literature of Colonialism @ (LA-AS)

Fall. 4 credits. Next offered 2010–2011.
N. Melas.]

COML 3150 Literature and Media in Japan (also ASIAN/VISST 3318)

Fall. 4 credits. B. de Bary.
For description, see ASIAN 3318.

COML 3260 Christianity and Judaism (also RELST 3260) # (LA-AS)

Spring. 4 credits. C. Carmichael.
Study of the New Testament as a product of the first-century Palestinian and Hellenistic Judaism. Other text (also in translation): *The Passover Haggadah*.

COML 3280 Literature of the Old Testament (also RELST 3280) @ # (LA-AS)

Fall. 4 credits. C. M. Carmichael.
Analysis of small sections of well-known material for in-depth discussion.

COML 3300 Political Theory and Cinema (also GERST 3550, GOVT 3705, FILM 3290) (CA-AS)

Spring. 3 credits. G. Waite.
For description, see GERST 3550.

COML 3440 The Tragic Theatre (also CLASS 3645, THETR 3450) # (LA-AS)

Spring. 4 credits. F. Ahl.
For description, see CLASS 3645.

COML 3480 Shakespeare and Europe (also ENGL 3490) # (LA-AS)

Fall. 4 credits. W. J. Kennedy.
In their own times, Shakespeare's plays registered a strong interest in the culture and society of Renaissance Europe beyond England. In later times, they cast a powerful spell over culture and society in 19th- and 20th-century Europe. This course will examine their debts to and influences upon continental drama. Readings will focus upon Shakespeare's plays in relation to Italian comedy, early French tragedy, and plays by Friedrich Schiller, Bertolt Brecht, and Luigi Pirandello.

COML 3550 Decadence (also ENGL/FGSS 3550) (LA-AS)

Spring. 4 credits. E. Hanson.
For description, see ENGL 3550.

[COML 3620 The Culture of the Renaissance II (also ARTH 3420, ENGL 3250, FREN 3620, HIST 3640, MUSIC 3242) # (CA-AS)

Fall. 4 credits. Required F sec. Next offered 2010–2011. W. J. Kennedy.]

COML 3630 The European Novel # (LA-AS)

Fall. 4 credits. N. Saccamano.
This course will survey the history of the novel until the mid-19th century, focusing on the social, literary, and philosophical significance of its narrative forms. Topics to be discussed: the novel as a site of conflict between "high" and "low" culture; the relation of fictional narrative to historical and autobiographical narrative; the gender politics and class ideology of romance. Texts may include *Lazarillo de Tormes* or Cervantes' *Don Quixote*, Fielding's *Tom Jones*, Laclós's *Dangerous Liaisons*, Goethe's *The Sorrows of Young Werther*, Brontë's *Wuthering Heights*.

[COML 3640 The European Novel # (LA-AS)

Spring. 4 credits. Next offered 2010–2011.
Staff.]

[COML 3650 Contemporary Fiction @ (LA-AS)

Spring. 4 credits. Next offered 2011–2012.
B. Maxwell.]

COML 3701 Global Martial Arts Film and Literature (also ASIAN 3370, FILM 3701)

Spring. 4 credits. Required: weekly film viewings W 7:30–9:30 p.m.; enrollment in sec 101. P. Liu.

With recent blockbusters such as *Kill Bill*, *Kung Fu Hustle*, *Hero*, and *The Matrix*, a spiritual and bodily discipline from medieval Asia called "martial arts" has turned into an object of popular consumption in transnational cinema. This course studies the Asianization of global postmodern culture by comparing the historical routes, institutional bases, and ideologies of representations of martial arts in film and literature. Our questions will include the historical origins of martial arts and martial arts cinema; differences between "wuxia" and "kung fu"; contemporary Hong Kong, Taiwan, and Hollywood popular culture; Orientalism, race, and masculinity in transnational cinema; kinship, rites, honor, and duty in Chinese society; kung fu as philosophy; and the relation of martial arts to women, ethics, nation, work, and pleasure.

COML 3723 The Arabian Nights Now and Then (NES 3723/6723) @ # (LA-AS)

Fall. 3 credits. S. Toorawa.
For description, see NES 3723.

COML 3735 Puppetry: Comic, Dramatic, and Political

Spring. 4 credits. B. Maxwell.
Puppetry is eminently suited to cross-cultural, cross-generic comparative aesthetic study, and such an inquiry is what I propose. It will perhaps need little discussion if I also mention that puppetry might well be the most frequently used metaphor in characterizations of political life and operations, including electoral politics, but also authoritarian systems. At the same time, puppetry as practice, not metaphor, has been an immense, longstanding, and perennially effective reservoir for political protest. I would plan to include throughout the course attention to aesthetic and political theories that have illuminated puppetry (and in some cases might be illumined by it: a puppet theatre debate between feminists, Marxists, and deconstructionists, refereed by a puppet homeless person, for example).

COML 3799 Imagining the Other, Jews and Arabs in Contemporary Literature and Film (also NES/JWST 3799) @ (LA-AS)

Fall. 3 credits. D. Starr.
For description, see NES 3799.

COML 3800 Poetry and Poetics of Americas (also AMST 3820, LATA/SPAN 3800) (LA-AS)

Fall. 4 credits. J. Monroe.
As globalization draws the Americas ever closer together, reshaping our sense of a common (uncommon) American culture, what claims might be made for a distinctive, diverse "poetry of the Americas? How might we characterize its dominant forms and alternative practices? What shared influences, affiliations,

concerns and approaches might we find and what differences emerge? Ranging across North and South America, Central America and the Caribbean, this course will place in conversation such figures as Whitman, Neruda, Poe, Borges, Dickinson, Martí, Stein, Darío, Williams, Mistral, Pound, Paz, Olson, Burgos, Rich, Césaire, Walcott, Glissant, Oppen, Brathwaite, Parra, Ashbery, Zurí, Bernstein, Harjo, Perdomo, Cisneros, Castillo, and Vicuna. All texts not written in English will be available in translation as well as in the original.

COML 3840 Art of Historical Avant-Garde (also GERST/ROMS 3770, ARTH/VISST 3720) (LA-AS)

Spring. 4 credits. P. McBride.
For description, see GERST 3770.

COML 3850 Partition/Fiction and Film (also ASIAN 3389, VISST 3851)

Fall. 4 credits. A. Banerjee.
The Partition of 1947 remains the defining moment of the birth of the nation in India, Pakistan, and Bangladesh. While academic discourse has only recently begun to tackle the human dimensions of this incredibly traumatic event—with an estimated million dead and twelve million displaced—Partition has been a rich subject for literature and cinema over the last half century. Now more than ever before, it continues to serve as a fulcrum in creating narratives of national, religious, linguistic, and gendered identity. The course surveys fictional and filmic treatments of the Partition from 1947 to 2007.

[COML 3860 Literature and Film of South Asia (also ASIAN 3387, VISST 3870) @ (CA-AS)

Spring. 4 credits. Next offered 2010–2011.
A. Banerjee.]

[COML 3901 Poetry's Image

Spring. 4 credits. Next offered 2010–2011.
J. Monroe.]

[COML 3980 Theorizing Gender and Race in Asian Histories and Literatures (also ASIAN 3388/6688, COML 6680, FGSS 3580/6580) @ (CA-AS)

Spring. 4 credits. Next offered 2010–2011.
N. Sakai.]

[COML 4000 Forms of the Novel (LA-AS)

Fall. 4 credits. Next offered 2010–2011.
P. Liu.]

COML 4020 Dis/abled Bodies: Literature, Philosophy, and Culture

Spring. 4 credits. Core course for COML majors. Limited to 15 students. A. Weiner.
This seminar will question ideas about what constitutes a "normal" or "able" body, seeking instead to respond to literary, philosophical, and cultural articulations of physical, mental, emotional, and sensory differences. We will engage various debates in disability studies in order to challenge assumptions and posit new models of imagining the body, its interpretive and performative spaces, and the ethical valences of its transgressions. We'll also consider the possibilities and problems of what a "rights"-based discourse means for (re)defining disability socially and politically. Literary works from Sophocles, Shakespeare, Mary Shelley, Kafka, Faulkner, and Coetzee will be placed in dialogue with critical and theoretical readings from Freud, Kristeva, Foucault, Elaine Scarry, Jean-Luc Nancy, Judith Butler, Donna Haraway, Rosemarie Garland Thomson, and Tobin Siebers.

COML 4065 Life as We Know It: Readings in the BioPolitical Paradigm (also SHUM/ITAL 4822)

Fall. 4 credits. T. Campbell.
For description, see SHUM 4822.

COML 4066 Secular Disaffections: On Islam and the Politics of Emotion (also SHUM/RELST 4823, NES 4923)

Fall. 4 credits. R. Mas.
For description, see SHUM 4823.

[COML 4100 Science, Technology, and Culture (also STS 4101) (CA-AS)]

Fall. 4 credits. Next offered 2010–2011.
A. Banerjee.]

COML 4115 Link, Network, Nexu (also FREN/SHUM 4936, GOVT 4748, STS 4361)

Spring. 4 credits. B. Massumi.
For description, see SHUM 4936.

COML 4190–4200 Independent Study

4190, fall; 4200, spring. Variable credit. COML 4190 and 4200 may be taken independently of each other. Applications available in 247 Goldwin Smith Hall. Students must prepare a proposal for independent study (proposal forms are available in the Office of Undergraduate Admissions and Advising, 55 and 172 Goldwin Smith Hall).

COML 4220 Literature and Oblivion (LA-AS)

Fall. 4 credits. Core course for COML majors. Limited to 15 students. N. Melas. This course will attempt a critical study of the powers of art against oblivion. We will start with the paradox whereby poetic language necessarily destroys that which it seeks to preserve, just as a monument substitutes for the loss object it commemorates. A central concern will be the relation of art to history, particularly when art's negations encounter powerful worldly negations, such as those surrounding gender difference and colonial domination. Framed by Homer's *Iliad* and Derek Walcott's "postcolonial" Caribbean epic *Omeros*, the readings will also be a comparative exercise in reading across time and space and will include theoretical texts (Plato, Hegel, Nietzsche, Blanchot, Benjamin, Patterson) alongside literature. Particular attention will be directed to improving critical writing skills.

COML 4250 Marx, Nietzsche, Freud (also GERST 4150, GOVT 4735) # (CA-AS)

Fall. 4 credits. G. Waite.
For description, see GERST 4150.

COML 4260 New Testament Seminar (also RELST 4260) # (HA-AS)

Spring. 4 credits. Limited to 15 students. C. Carmichael.
Topic: Sex and religion in the Bible. Identification and discussion of problems in the New Testament. Discussing attitudes to sexuality in the Bible, we will examine in Old and New Testament texts the clash between ancestral behavior and subsequent laws, as well as the contrast between legal and religious ideas. Topics will include: marriage and divorce, incest, intermarriage, gender discrimination, guilt and shame, homosexuality, women and purity, sexual language and symbols. It should be possible to say something new about the topics and also, because of the perennial nature of the issues, to say something that is relevant to contemporary life.

COML 4280 Biblical Seminar (also RELST 4280) # @ (HA-AS)

Fall. 4 credits. Limited to 15 students. C. Carmichael.
A study of how biblical ethical and legal rules (in Exodus, Leviticus, and Deuteronomy) comment on incidents in the biblical narratives (Genesis–2 Kings). The link between law and narrative enables us to observe in detail how ancient thinkers evaluate ethical and legal problems of perennial interest.

COML 4290 Postcolonial Poetry and the Poetics of Relation (also COML 6350, ENGL 4840/6850, FREN/SPAN 4350/6350)

Spring. 4 credits. Limited to 15 students. J. Monroe.
What kinds of poetry might be usefully characterized as "postcolonial" and what are the stakes of such a designation? What relation do specific poetic features have to geopolitical, cultural, historical, economic circumstances, and to the condition(s) of what has come to be called the "postcolonial" in particular? With special reference to Edouard Glissant's influential concept of a "poetics of relation," attending as well to our own situatedness as readers—perhaps also, though not necessarily, as writers—of poetry within U.S. (and) academic context(s), this seminar will focus on Caribbean and U.S. poetry as especially fruitful sites for exploring a diversity of approaches to these and related questions concerning postcoloniality, poetry, community, language, culture, and identity.

COML 4365 Caribbean Crossings (also COML 6365) (CA-AS)

Spring. 4 credits. N. Melas.
A critical overview of Caribbean literature in French, English, and Creole with particular attention to the historical, political and aesthetic nodes of connection and disconnection between them. Topics will include the differential cultures of the plantation system and forms of resistance to it, nationalist and anti-colonial movements, language and racial politics, local cultures in global flows. Reading knowledge of French helpful but not required.

[COML 4380 Arendt, Morisaki, Weil (also ASIAN 4468/6668, COML 6240) (KCM-AS)]

Spring. 4 credits. Limited to 20 students. Next offered 2010–2011. B. de Bary.]

COML 4430 Cold War Aesthetics in East Asia (also ASIAN 4465)

Fall. 4 credits. Limited to 15 students. P. Liu.
This course is concerned with literature, music, film, and the Cold War in East Asia—the "partitioning" of China, Japan, and Korea into mutually hostile and temporally de-synchronized "zones" in the post-WWII era. How do aesthetic works explore this historical trauma and ideological rift? Beginning with the major historical and social scientific writings on the formation of "East Asia" as a region, we will study the shifting relations between U.S. and East Asian cultures through a comparison of two case studies: the creation of North Korea/South Korea, and the division/unification of Taiwan/China. We will compare Korean and Chinese histories of anti-Communism, responses to the legacy of Japanese colonialism, industries of popular culture, and the strategic positions of South Korea and Taiwan as U.S. security concerns.

[COML 4500 Renaissance Poetry (also COML 6500, ENGL 6220, ITAL 4500/6500) # (LA-AS)]

Fall. 4 credits. Next offered 2010–2011. W. J. Kennedy.]

COML 4515 Ariosto, Rabelais, Spenser (also COML 6515, ENGL/ROMS 4515/6515) (LA-AS)

Fall. 4 credits. W. J. Kennedy.
A study of competing claims between narrative forms and national ideologies in Ariosto's epic romance, *Orlando Furioso* (Italy, 1516–32); Rabelais's prose fiction, *Gargantua and Pantagruel* (France, 1532–52); and Spenser's allegorical epic, *The Faerie Queene* (England, 1590–96).

[COML 4520 Renaissance Humanism (also COML 6520) # (LA-AS)]

Spring. 4 credits. Limited to 15 students. Next offered 2010–2011. W. J. Kennedy.]

[COML 4580 Narratives of Travel, Migration, and Exile (CA-AS)]

Fall. 4 credits. Limited to 15 students. Next offered 2010–2011. A. Banerjee.]

COML 4600 New York, Paris, Baghdad: Poetry of the City (also NES 4727, FREN 4080)

Spring. 4 credits. S. Toorawa.
For description, see NES 6727.

COML 4675 Creativity and Constraints (also FREN 4520)

Spring. 4 credits. T. McNulty.
For description, see FREN 4520.

[COML 4700 Translation and Cultural Difference (also ASIAN 4481) @ (KCM-AS)]

Fall. 4 credits. Limited to 15 students. Next offered 2010–2011. N. Sakai.
For description, see ASIAN 4481.]

COML 4740 Topics in Modern European Intellectual and Cultural History (also HIST 4740, JWST 4674)

Fall. 4 credits. Prerequisite: permission of instructor. D. LaCapra.
Topic: History and the Human Animal. For description, see HIST 4740.

[COML 4800 Baudelaire in the Lyric # (LA-AS)]

Spring. 4 credits. Not offered 2010–2011. J. Culler.]

[COML 4810 Studies in Gender Theory: Kinship and Embodiment (also FGSS 4800) (CA-AS)]

Spring. 4 credits. Limited to 15 students. Next offered 2010–2011. P. Liu.]

COML 4830 Imagining the Holocaust (also ENGL/JWST 4580, GERST 4570) (LA-AS)

Spring. 4 credits. D. Schwarz.
For description, see ENGL 4580.

COML 4860 Contemporary Poetry and Poetics (also COML 6865, ENGL/SPAN 4880) (LA-AS)

Fall. 4 credits. Limited to 15 students. J. Monroe.
What gives contemporary poetry and poetics its resonance and value? What are its dominant features, audiences, and purposes? In an increasingly global, pervasively technological culture, what's become of such familiar distinctions as the "traditional" and the "experimental," the "mainstream" and the "alternative"? How does contemporary poetry situate itself among other genres, disciplines, discourses, and media? How are we to

understand its evolving public spheres and its relation to the central cultural and historical developments of our time? With special attention to poetry since 9/11, this seminar will explore these and related questions in a range of works that open onto the rich interplay of contemporary poetry and poetics with issues concerning personal and collective identity, language, and culture.

COML 4900 Energy, Empire, Modernity (also COML 6900)

Fall. 4 credits. Limited to 15 students. A. Banerjee.

The course examines steam, electricity, nuclear power, and petroleum at the juncture of coloniality and modernity. By juxtaposing literary, visual, philosophical, and social scientific treatments from the western/northern perspective with those from colonial and postcolonial ones, we will attempt to generate a critical vocabulary for the ways in which energy becomes the index of power in both the literal and figurative sense. Texts include Joseph Conrad's *Heart of Darkness*, Khushwant Singh's *Train to Pakistan*, Arundhati Roy's *Power Politics*, Abdelrehman Munif's *Cities of Salt*, Amos Tutuola's *The Palm-Wine Drinkard*, Andrei Tarkovsky's *Stalker*, and Stephen Gaghan's *Syriana*.

COML 4930-4940 Senior Essay

Fall and spring. 8 credits.

Times TBA individually in consultation with director of Senior Essay Colloquium. Approximately 50 pages to be written over the course of two semesters in the student's senior year under the direction of the student's advisor. An R grade is assigned on the basis of research and a preliminary draft completed in the first semester. A letter grade is awarded on completion of the second semester.

COML 4960 Imagining the Mediterranean (also JWST/NES 4738) @ (LA-AS)

Spring. 4 credits. G. Holst-Warhaft.

For description, see NES 4738.

[COML 6020 Literature and Theory (also ENGL 6020)

Fall. 4 credits. Next offered 2010-2011. J. Culler.]

COML 6050 Contemporary Global Fiction (also ENGL 6830)

Fall. 4 credits. Please prepare the assignment listed on the course's Blackboard site for the first meeting of the class, W, Sept. 2. W. Cohen.

The (mainly) post-1945 novel, understood as the first full instance of world literature. Emphasis on global transformations of a primarily European genre. Issues of form—realism, modernism, postmodernism—and of relations among languages, nations, social systems, and continents in the modern world system. Probable readings: Platonov, Hedayat, Borges, Borowski, Beckett, Manto, Achebe, Lispector, Nabokov, Salih, Calvino, Kiš, Devi, Murakami, Han Shaogong, and Morrison. Criticism by Jameson, Casanova, Moretti, Spivak, and others.

COML 6051 Theory of the Theatre and Drama (also GERST 4310, THETR 4310/6310)

Fall. 4 credits. H. Yan.

For description, see THETR 6310.

COML 6160 Translation, in Theory (also ASIAN 6619, VISST 6190)

Spring. 4 credits. B. de Bary.

For description, see ASIAN 6619.

COML 6185 Introduction to Systems Theory (also GERST 6190)

Fall. 4 credits. P. Gilgen.

For description, see GERST 6190.

COML 6190-6200 Independent Study

6190, fall; 6200, spring. Variable credit.

COML 6190 and 6200 may be taken independently of each other. Applications available in 247 Goldwin Smith Hall.

COML 6235 Heidegger's Literature (also GERST 6650)

Fall. 4 credits. A. Schwarz.

For description, see GERST 6650.

[COML 6240 Arendt, Morisaki, Weil (also ASIAN 4468/6668, COML 4380)

Spring. 4 credits. Next offered 2010-2011.

B. de Bary.]

[COML 6300 Aesthetics in the 18th Century (also ENGL 6300)

Fall. 4 credits. Next offered 2010-2011.

N. Saccamano.]

COML 6333 Negrismo and Négritude: Modernism and the Emergence of Africanist Poetics and Politics in the Caribbean (also SPAN 6150)

Fall. 4 credits. G. Aching.

For description, see SPAN 6150.

[COML 6340 Deleuze and Lyotard: Aesthetics (also ENGL 6290, FREN 6720, VISST 6340)

Spring. 4 credits. Next offered 2010-2011.

T. Murray.]

COML 6350 Postcolonial Poetry and the Poetics of Relation (also COML 4290, ENGL 4840/6850, FREN/SPAN 6350)

Spring. 4 credits. Limited to 15 students.

J. Monroe.

For description, see COML 4290.

[COML 6360 Comparative Modernisms/ Alternative Modernities

Fall. 4 credits. Limited to 15 students. Next offered 2010-2011. N. Melas.]

COML 6365 Caribbean Crossings (also COML 4365)

Spring. 4 credits. N. Melas.

For description, see COML 4365.

[COML 6380 The 18th Century and the Emergence of Literary Modernity (also ASIAN 6626)

Spring. 4 credits. Next offered 2010-2011.

N. Sakai.]

[COML 6410 Derrida, Writing, and the Institution of Literature (also ENGL 4410/6420)

Spring. 4 credits. Next offered 2010-2011.

J. Culler.]

COML 6465 Black Feminist Theories (also ASRC/ENGL 6207)

Fall. 4 credits. C. Boyce Davies.

For description, see ASRC 6207.

[COML 6500 Renaissance Poetry (also COML 4500, ENGL 6220)

Fall. 4 credits. Next offered 2010-2011.

W. J. Kennedy.]

COML 6515 Ariosto, Rabelais, Spenser (also COML 4515, ENGL/ROMS 4515/6515)

Fall. 4 credits. W. J. Kennedy.

For description, see COML 4515.

[COML 6520 Renaissance Humanism (also COML 4520)

Spring. 4 credits. Limited to 15 students.

Next offered 2010-2011. W. J. Kennedy.]

COML 6675 Derrida and Philosophy of Hospitality (also GOVT 6675, HADM/ FREN 5590)

Fall. 4 credits. D. Rubenstein and L. Shaffer.

For description, see GOVT 6675.

[COML 6710 Transnational Imaginaries: Globalization and Culture

Fall. 4 credits. Limited to 15 students. Next offered 2010-2011. N. Melas.]

COML 6720 Topics in Modern European Intellectual and Cultural History (also HIST 6720)

Fall. 4 credits. D. LaCapra.

For description, see HIST 6720.

COML 6723 The Arabian Nights, Then and Now (also COML 3723, NES 3723/6723)

Fall. 4 credits. S. Toorawa.

For description, see NES 6723.

[COML 6791 Acoustic Horizons: Aesthetics and Politics of Sound in Theory, Film, and New Media (also ENGL 6791)

Spring. 4 credits. Next offered 2010-2011. T. Murray.]

COML 6792 Theory of the Lyric (also ENGL 6792)

Fall. 4 credits. J. Culler.

For description, see ENGL 6792.

COML 6820 Cultural Materialism and Geopolitics

Fall. 4 credits. Limited to 15 students. P. Liu.

What is a "materialist" analysis of culture? Are the "material" and the "cultural" mutually exclusive? This course examines the foundational texts in "cultural materialism" (Marx, Lukacs, Gramsci, Althusser, Spivak, Jameson) and the implications of a dualistic construction of material vs. cultural life for geopolitical thinking. We will be interested in the different ways in which tropes of "matter" and "world" are appropriated to delineate new temporal and spatial relations in postcolonial conversations (Fanon, Said, Lye, Chatterjee, Gilroy). By paying special attention to debates about uneven development, the materiality of race and the body, and alternative modernities, we will seek to understand "materialism" itself as an overdetermined category in 20th-century political history.

COML 6860 Althusser and Lacan (also FRLIT 6230, GERST 6860, GOVT 6790)

Fall. 4 credits. G. Waite.

For description, see GERST 6860.

COML 6865 Contemporary Poetry and Poetics (also COML 4860, ENGL/ SPAN 4880)

Fall. 4 credits. J. Monroe.

For description, see COML 4860.

COML 6900 Energy, Empire, and Modernity (also COML 4900)

Fall. 4 credits. A. Banerjee.

For description, see COML 4900.

[COML 6921 Digital Bodies, Virtual Identities (also ENGL 6960, THETR 6330)

Fall. 4 credits. Next offered 2010-2011.

T. Murray.]

[COML 6970 Cosmopolitanism (also ENGL 6970)

Spring. 4 credits. Next offered 2010-2011. N. Saccamano.]

COMPUTER SCIENCE

E. Tardos, chair; G. Bailey, K. Bala, D. Bindel, K. Birman, C. Cardie, R. L. Constable, D. Fan, P. Francis, J. Gehrke, C. Gomes, D. Greenberg, D. Gries, J. Halpern, J. E. Hopcroft, D. Huttenlocher, D. James, T. Joachims, J. Kleinberg, R. Kleinberg, C. Koch, D. Kozen, L. Lee, S. Marschner, A. Myers, R. Pass, F. B. Schneider, B. Selman, D. Shmoys, E. G. Sifer, N. Snavely, R. Teitelbaum, C. Van Loan, H. Weatherspoon, R. Zabih

The Department of Computer Science is affiliated with both the College of Arts and Sciences and the College of Engineering. Students in either college may major in Computer Science. For details, visit our web site at www.cs.cornell.edu/ugrad.

The Major

CS majors take courses covering algorithms, data structures, logic, programming languages, systems, and theory. Electives include artificial intelligence, computer graphics, computer vision, cryptography, databases, networks, and scientific computing. Requirements include:

- MATH 1110, 1120 (or 1220) and 2210 or (MATH 1910, 1920, and 2940)
- two semesters of introductory computer programming (CS 1110 and CS 2110 or CS 1112, 1130, and 2110). CS 1114 is an honors-level substitute for CS 1112.
- a five-course computer science core (CS 2800, 3110, 3410, or 3420; 4410, and 4820)
- three 4000+ level computer science electives (CS 4999 not allowed; CS 3220 and CS 3810 allowed). If CS 2800 was taken before Spring 2009, CS 3810 or CS 4810 must be either one of these electives or one of the technical electives (see below).
- a computer science project course (CS 4121, 4321, 4411, 4450, 4621, 4701, 5150, 5410, or 6670)
- three 3000+ level courses (only one of ENGRD 2700 or MATH 2930 may be counted) that are technical in nature, as determined by the major.
- a three-course “external specialization” in a topic area other than computer science, all numbered 3000 level or greater
- one of BTRY 4080, ECE 3100, ECON 3190, ENGRD 2700, MATH 4710. CS majors in the Engineering College can use ECE 3100 as a substitute for ENGRD 2700 in satisfying the engineering distribution requirements.
- an elective requirement consisting of a single 3+ credit course or a combination of courses coming to 3+ credits total. Roughly speaking, all academic courses (inside or outside of CS) count. No PE courses, courses numbered 10xx, or ROTC courses below the 3000 level are allowed.

All the major electives described above must be courses of at least 3 credits, with the exception of the CS project course, which is at least 2 credits, or as otherwise specified.

Additionally, students’ course selections must satisfy the requirements of at least one “vector” or CS-centric specialization, defined by the department. The set of vectors at the time of this writing include artificial intelligence, computational science and engineering, data-intensive computing,

graphics, human-language technologies, network science, programming languages, security and trustworthy systems, software engineering/code warrior, systems, theory, and a broad “Renaissance” vector. See www.cs.cornell.edu/ugrad for the requirements of each vector.

The program is broad and rigorous, but it is structured in a way that supports in-depth study of outside areas. Intelligent course selection can set the stage for graduate study and employment in any technical area and any professional area such as business, law, or medicine. With the advisor, the Computer Science major is expected to put together a coherent program of study that supports career objectives and is true to the aims of liberal education.

Admission

All potential affiliates are reviewed on a case-by-case basis relative to the following criteria:

- a grade of C or better in all CS courses and MATH courses
- a GPA of 2.5 or better in CS 2110 and 2800.
- a GPA of 2.5 or better in MATH 1120 (or 1220 or 1920) and CS 2800.

Courses used in the affiliation GPA computations may be repeated if the original course grade was below a C. The most recent grade will be used for all repeated courses. Qualifying courses must be taken at Cornell.

Departmental honors in Computer Science is granted to students who have maintained a cumulative GPA greater than or equal to 3.5 and completed a set of coherent courses and research activities that satisfy the following requirements:

- at least one CS course (at least 3 credit hours) at or above the 5000 level with a grade of A– or better; no seminars.
- at least two 3-credit semesters of CS 4999 (Independent Research) with a CS faculty member, with grades of A– or better each semester.

Latin Designations (appended to the degree), awarded by the field of Computer Science for all who qualify as stated above, are based on the final cumulative GPA, as follows:

- *cum laude*, 3.50 or above
- *magna cum laude*, 3.75 or above
- *summa cum laude*, 4.00 or above

Note: Honors courses may not be used to satisfy the CS 4000+ elective requirement, the CS project requirement, the technical electives, or the 3+ credit elective. See the CS undergraduate web site for more information on eligibility: www.cs.cornell.edu/ugrad.

Computing in the Arts Undergraduate Minor

A minor in Computing in the Arts with an emphasis on computer science is available both to Computer Science majors and to students majoring in other subjects. For more information, see p. 531.

Courses

For complete course descriptions, see “Computer Science” under “Computing and Information Science (CIS).”

CS 1109 Fundamental Programming Concepts

Summer. 2 credits. Pre-freshman standing or permission of instructor. Prerequisites: none. S–U grades only.

CS 1110, 1112 Introduction to Computer Programming (MQR)

Fall, spring, summer. 4 credits. *Students may not receive credit for CS 1110, 1112, 1113, 1114 and BEE 1510.*

CS 1110, CS 1112, and CS 1114 are all described in the “Computing and Information Science (CIS)” section.

CS 1130 Transition to Object-Oriented Programming

Fall, spring. 1 credit. Prerequisite: one course in programming. S–U grades only.

CS 1132 Transition to Matlab

Fall, spring. 1 credit. Prerequisite: one course in programming. S–U grades only.

CS 1300 Introductory Design and Programming for the Web (also INFO 1300)

Fall. 4 credits.

CS 1610 Computing in the Arts (also CIS/ ENGRD 1610, DANCE 1540, FILM 1750, MUSIC 1465, PSYCH 1650) (LA-AS)

Fall. 3 credits. Recommended: good comfort level with computers and some of the arts.

CS 1620 Visual Imaging in the Electronic Age (also ARCH 3702, ART 1700, CIS/ ENGRD 1620)

Fall. 3 credits.

For description, see ART 1700.

CS 1710 Introduction to Cognitive Science (also COGST 1101, LING 1170, PHIL 1910, PSYCH 1102) (KCM-AS)

Fall, summer. 3 credits.

For description, see COGST 1101.

CS 2022 Introduction to C

Fall, spring, usually weeks 1–4. 1 credit. Prerequisite: one programming course or equivalent programming experience. Credit granted for both CS 2022 and 2024 only if 2022 taken first. S–U grades only.

CS 2024 C++ Programming

Fall. 2 credits. Prerequisite: one programming course or equivalent programming experience. Students who plan to take CS 2022 and 2024 must take 2022 first. S–U grades only.

CS 2026 Introduction to C

Spring, usually weeks 5–8. 1 credit. Prerequisite: CS/ENGRD 2110 or equivalent experience. S–U grades only.

CS 2042 Unix Tools

Fall, usually weeks 5–8. 1 credit. Prerequisite: one programming course or equivalent programming experience. S–U grades only.

CS 2044 Advanced UNIX Programming and Tools

Spring, usually weeks 5–8. 1 credit. Prerequisite: CS 2042 or equivalent. S–U grades only.

CS 2110 Object-Oriented Programming and Data Structures (also ENGRD 2110) (MQR)

Fall, spring, summer. 3 credits. Prerequisite: CS 1110, CS 1130, or CS 1113 (CS 1112 if completed before fall 2007) or equivalent course in Java or C++.

CS 2300 Intermediate Design and Programming for the Web (also INFO 2300)

Spring. 3 credits. Prerequisite: CS 1300 strongly recommended.

CS 2800 Discrete Structures (MQR)

Fall, spring. 3 credits. Pre- or corequisite: one programming course or permission of instructor.

CS 2850 Networks (also ECON/INFO 2040, SOC 2090) (SBA-AS)

Spring. 4 credits. Prerequisites: none.

CS 3110 Data Structures and Functional Programming (MQR)

Fall, spring. 4 credits. Prerequisite: CS 2110 and 2111 or equivalent programming experience. Pre- or corequisite: CS 2800. Should not be taken concurrently with CS 3410 or 3420.

CS 3220 Introduction to Scientific Computation (also ENGRD 3220)

Spring, summer. 3 credits. Prerequisites: CS 1112 or 1132 and MATH 2220, 2230, or 2940.

CS 3300 Data-Driven Web Applications (also INFO 3300)

Spring. 3 credits. Prerequisite: CS/ENGRD 2110 and (CS 2300 or permission of instructor). CS majors may use only one of the following toward their degree: CS/INFO 3300 or CS 4321.

CS 3410 Systems Programming

Spring. 4 credits. Prerequisites: CS 2110 or equivalent programming experience. Should not be taken concurrently with CS 3110.

CS 3420 Computer Organization (also ECE 3140)

Spring. 4 credits. Prerequisite: CS 2110 or ENGRD 2300. Should not be taken concurrently with CS 3110.

CS 3740 Computational Linguistics (also COGST 4240, LING 4424) (MQR-AS)

Fall or spring. 4 credits. Recommended: CS 2042.

CS 3810 Introduction to Theory of Computing

Fall, summer. 3 credits. Prerequisite: CS 2800 or permission of instructor.

CS 4120 Introduction to Compilers

Fall. 3 credits. Prerequisites: CS 3110 or permission of instructor and CS 3410 or 3420. Corequisite: CS 4121.

CS 4121 Practicum in Compilers

Fall. 2 credits. Corequisite: CS 4120.

CS 4210 Numerical Analysis and Differential Equations (also MATH 4250) (MQR)

Fall. 4 credits. Prerequisites: MATH 2210 or 2940 or equivalent, one additional mathematics course numbered 3000 or above, and knowledge of programming.

CS 4220 Numerical Analysis: Linear and Nonlinear Equations (also MATH 4260) (MQR)

Spring. 4 credits. Prerequisites: MATH 2210 or 2940 or equivalent, one additional mathematics course numbered 3000 or above, and knowledge of programming.

CS 4300 Information Retrieval (also INFO 4300)

Fall. 3 credits. Prerequisite: CS 2110 or equivalent.

CS 4302 Web Information Systems (also INFO 4302)

Spring. 3 credits. Prerequisites: CS 2110 and some familiarity with web site technology.

CS 4320 Introduction to Database Systems

Fall. 3 credits. Prerequisites: CS 3110 (or 2110, 2111, and permission of instructor).

CS 4321 Practicum in Database Systems

Fall. 2 credits. Pre- or corequisite: CS 4320. CS majors may use only one of the following toward their degree: CS/INFO 3300 or CS 4321.

CS 4410 Operating Systems

Fall. 3 credits. Prerequisite: CS 3410 or 3420.

CS 4411 Practicum in Operating Systems

Fall. 2 credits. Corequisite: CS 4410.

CS 4420 Computer Architecture (also ECE 4750)

Fall. 4 credits. Prerequisites: ENGRD 2300 and CS 3420/ECE 3140.

CS 4620 Introduction to Computer Graphics (also ARCH 3704)

Fall. 3 credits. Prerequisite: CS/ENGRD 2110.

CS 4621 Computer Graphics Practicum

Fall. 2 credits. Pre- or corequisite: CS 4620.

CS 4700 Foundations of Artificial Intelligence

Fall. 3 credits. Prerequisites: CS 2110 and 2800 (or equivalent).

CS 4701 Practicum in Artificial Intelligence

Fall. 2 credits. Pre- or corequisite: CS 4700.

CS 4740 Introduction to Natural Language Processing (also COGST 4740, LING 4474)

Spring. 4 credits. Prerequisite: CS 2110.

CS 4780 Machine Learning

Spring. 4 credits. Prerequisites: CS 2110, CS 2800, or basic probability theory, and basic knowledge of linear algebra.

[CS 4782 Probabilistic Graphical Models (also BTRY 4790)

Fall. 4 credits. Prerequisites: probability theory (BTRY 4080 or equivalent), programming and data structures (CS 2110 or equivalent); a course in statistical methods is recommended but not required (BTRY 4090 or equivalent). Next offered 2010-2011.]

CS 4812 Quantum Info Processing (also PHYS 4481/7681) (PBS)

Spring. 3 credits. Prerequisite: familiarity with theory of vector spaces over complex numbers.

For description, see PHYS 4481.

CS 4820 Introduction to Analysis of Algorithms

Spring, summer. 4 credits. Prerequisites: CS 2800 and 3110.

[CS 4830 Introduction to Cryptography

Fall. 4 credits. Prerequisites: CS 2800 (or equivalent), mathematical maturity, or permission of instructor. Next offered 2010-2011.]

CS 4850 Mathematical Foundations for the Information Age

Spring. 4 credits. Prerequisite: mathematical maturity.

CS 4860 Applied Logic (also MATH 4860) (MQR)

Fall. 4 credits. Prerequisites: MATH 2220 or 2940, CS 2800 or equivalent (e.g., MATH 3320, 4320, 4340, 4810), and some additional course in mathematics or theoretical computer science.

CS 4999 Independent Reading and Research

Fall, spring. 1-4 credits.

CS 5150 Software Engineering

Fall. 4 credits. Prerequisite: CS 2110 or equivalent experience programming in Java or C++.

CS 5220 Applications of Parallel Computers

Spring. 4 credits. Prerequisite: course in numerical methods at level of CS 3220 or higher.

CS 5300 The Architecture of Large-Scale Information Systems (also INFO 5300)

Spring. 4 credits. Prerequisite: CS/INFO 3300 or CS 4320.

CS 5410 Intermediate Computer Systems

Fall or spring. 4 credits. Prerequisite: CS 4410 or permission of instructor. Next offered fall 2009.

CS 5420 Parallel Computer Architecture (also ECE 5720)

Fall. 4 credits. Prerequisite: ECE 4750. For description, see ECE 5720.

CS 5430 System Security

Fall or spring. 4 credits. Prerequisites: CS 4410 or 4450 and familiarity with JAVA, C, or C# programming languages. Next offered spring 2010.

CS 5620 Interactive Computer Graphics

Fall. 4 credits. Prerequisite: CS 4620.

CS 5643 Physically Based Animation for Computer Graphics

Spring. 4 credits. Prerequisites: CS/ENGRD 3220 and/or CS 4620 or permission of instructor.

CS 5722 Heuristic Methods for Optimization (also CEE 5290, ORIE 5340)

Fall. 3 or 4 credits. Prerequisites: CS/ENGRD 2110 or 3220 or CEE/ENGRD 3200, or graduate standing, or permission of instructor.

CS 6110 Advanced Programming Languages

Spring. 4 credits. Prerequisite: graduate standing or permission of instructor.

CS 6210 Matrix Computations

Fall. 4 credits. Prerequisites: MATH 4110 and 4310 or permission of instructor. Offered alternate years.

[CS 6240 Numerical Solution of Differential Equations]

Spring, 4 credits. Prerequisites: exposure to numerical analysis (e.g., CS 4210 or 6210), differential equations, and knowledge of MATLAB.]

CS 6320 Database Systems

Spring, 4 credits. Prerequisite: CS 4320 or permission of instructor.

CS 6322 Advanced Database Systems

Fall, 4 credits.

CS 6410 Advanced Systems

Fall or spring, 4 credits. Prerequisite: CS 4410 or permission of instructor. Next offered fall 2009.

CS 6460 Peer-to-Peer Systems

Spring, 4 credits. Recommended: CS 6410.

CS 6464 Advanced Distributed Storage Systems

Spring, 4 credits. Prerequisites: CS 4410 or permission of instructor.

[CS 6620 Advanced Interactive Graphics]

Fall or spring, 4 credits. Prerequisite: CS 4620 and 4621 or 5620 or permission of instructor. Next offered 2010–2011.]

CS 6630 Realistic Image Synthesis

Fall or spring, 4 credits. Prerequisites: CS 4620 or equivalent and undergraduate-level understanding of algorithms, programming, and vector calculus.

[CS 6650 Computational Motion]

Fall, 4 credits. Prerequisites: undergraduate-level understanding of algorithms, and some scientific computing. Offered alternate years; next offered 2010–2011.]

CS 6670 Computer Vision

Fall or spring, 4 credits. Prerequisites: undergraduate-level understanding of algorithms and MATH 2210 or equivalent. Next offered fall 2009.

CS 6700 Advanced Artificial Intelligence

Spring, 4 credits. Prerequisite: CS 4700 or permission of instructor.

CS 6740 Advanced Language Technologies (also INFO 6300)

Fall, spring, 3 credits. Prerequisite: permission of instructor. Neither CS 4300 nor CS 4740 are prerequisites.

[CS 6764 Reasoning about Knowledge]

Fall, 4 credits. Prerequisites: mathematical maturity and acquaintance with propositional logic. Next offered 2010–2011.]

CS 6780 Advanced Topics in Machine Learning

Fall or spring, 4 credits. Prerequisites: CS 4780 or equivalent, or CS 5780 or equivalent, or permission of instructor. Next offered fall 2009.

[CS 6782 Probabilistic Graphical Models (also BTRY 6790)]

Fall, 4 credits. Prerequisites: probability theory (BTRY 4080 or equivalent), programming and data structures (CS 2110 or equivalent); a course in statistical methods is recommended but not required (BTRY 4090 or equivalent). Next offered 2010–2011.]

[CS 6810 Theory of Computing]

Fall or spring, 4 credits. Prerequisite: CS 3810 and CS 4820 or 6820 or permission of instructor. Next offered 2010–2011.]

CS 6820 Analysis of Algorithms

Fall, 4 credits. Prerequisite: CS 4820 or graduate standing.

[CS 6822 Advanced Topics in Theory of Computing]

Fall or spring, 4 credits. Prerequisite: CS 6820 or permission of instructor. Next offered 2010–2011.]

CS 6830 Cryptography

Fall, 4 credits. Prerequisites: General ease with algorithms and elementary probability theory, maturity with mathematical proofs (ability to read and write mathematical proofs).

CS 6840 Algorithmic Game Theory

Fall or spring, 4 credits. Prerequisite: background in algorithms and graphs at level of CS 4820. No prior knowledge of game theory or economics assumed. Next offered spring 2010.

[CS 6850 The Structure of Information Networks (also INFO 6850)]**CS 6860 Logics of Programs**

Spring, 4 credits. Prerequisites: CS 4810, 6810, and (CS/MATH 4860 or MATH 4810).

CS 7090 Computer Science Colloquium

Fall, spring, 1 credit. For staff, visitors, and graduate students interested in computer science. S–U grades only.

CS 7190 Seminar in Programming Languages

Fall, spring, 1 credit. Prerequisite: CS 6110 or permission of instructor. S–U grades only.

CS 7192 Seminar in Programming Refinement Logics

Fall, spring, 4 credits. Prerequisite: permission of instructor.

CS 7320 Topics in Database Systems

Fall, spring, 4 credits. S–U grades only.

CS 7390 Database Seminar

Spring, 1 credit. Prerequisite: CS 6322 or permission of instructor. S–U grades only.

CS 7490 Systems Research Seminar

Fall, spring, 1 credit. S–U grades only.

CS 7690 Computer Graphics Seminar

Fall, spring, 3 credits.

[CS 7726 Evolutionary Computation and Design Automation (also MAE 6500)]

Spring, 4 credits. Prerequisite: programming experience or permission of instructor. Next offered 2010–2011.]

CS 7790 Seminar in Artificial Intelligence

Fall, spring, 4 credits. Prerequisite: permission of instructor. S–U grades only.

CS 7794 Seminar in Natural Language Understanding

Fall, spring, 2 credits.

CS 7860 Introduction to Kleene Algebra

Spring, 4 credits. Prerequisites: CS 4810 and (CS 4860 or MATH 4810).

CS 7890 Seminar in Theory of Algorithms and Computing

Fall, spring, 4 credits. Prerequisite: permission of instructor. S–U grades only.

CS 7893 Cryptography Seminar

Fall, spring, 1 credit.

CS 7999 Independent Research

Fall, spring. Prerequisite: permission of a Computer Science advisor. Independent research for master of engineering project.

CS 9999 Thesis Research

Fall, spring. Prerequisite: permission of a Computer Science advisor. S–U grades only. Doctoral research.

COMPUTING IN THE ARTS UNDERGRADUATE MINOR

The computer plays a role in almost every aspect of human life, and its influence and potential now extend routinely not only to technical and commercial pursuits but also into the realms of the imaginative and the aesthetic. The Computing in the Arts minor offers students opportunities to use computers to realize works of art, to study the perception of artistic phenomena, and to think about new, computer-influenced paradigms and metaphors for the experiences of making and appreciating art. Faculty from several departments in the college offer courses toward the minor, drawing on disciplines in the arts, the social sciences, the humanities, and the physical sciences. Currently, the minor is offered in five tracks: computer science, dance, film, music, and psychology, each described in more detail below. Students may minor in the same area as their major, or in a different area.

It is likely that additional tracks in other disciplines will be added to the minor, indeed possible that this will have occurred after the publication deadline for this year's *Courses of Study* but in time to take effect in the 2009–2010 academic year. The director and area representatives listed below will always have the latest information.

Director

Graeme Bailey

Applying for the Minor and Choosing Courses

Students should meet with the track representative in their chosen discipline for initial advising about the minor. For 2009–2010, these representatives are Graeme Bailey (computer science track), Kevin Ernste (music track), Allen Fogelsanger (dance track), Marilyn Rivchin (film track), and Carol Krumhansl (psychology track).

Regardless of which track they choose, all students in the minor are required to take the core course, Computing in the Arts (CS 1610, cross-listed as CIS 1610, DANCE 1540, ENGR 1610, FILM 1750, MUSIC 1465, and PSYCH 1650). This course combines fundamental background in cognitive modeling, statistics, programming, and algorithmic thinking, as preparation for more specialized work; hence, though it is not a formal prerequisite to other courses, it should be taken as early as possible in the student's program. For students who have already gained an equivalent background through other courses, however, it may be waived by permission of the director.

In addition to the core course, each student chooses another five courses satisfying the following requirements:

1. At least one must entail a significant computing component, regardless of its home department (marked * in the lists below).
2. At least two must entail a significant artistic component (marked † in the lists below).
3. For students majoring in a field offering a track, none of the courses from that track may be double-counted as also satisfying major requirements.

The goal is to encourage the development of reasonable depth within one area, without neglecting the interdisciplinary nature of the field. Hence, rather than choosing courses at random from the lists below or focusing too narrowly on one particular corner of the field, each student should work actively with an advisor from his or her minor in building an appropriate program.

Course Lists

Computer Science track. In addition to the core course, CS 1610, any five of the following. Note that some of these courses have CS prerequisites.

- †ART 1700 Visual Imaging in the Electronic Age (also ARCH 4508, CIS 1620, ENGRI 1620)
 - *†CIS 3000 Introduction to Computer Game Design
 - *CS 2110 Object-Oriented Programming and Data Structures
 - *CS 4620 Introduction to Computer Graphics
 - *CS 4700 Foundations of Artificial Intelligence
 - *CS 4740 Introduction to Natural Language Processing
 - *CS 4780 Machine Learning
 - *CS 5640 Computer Animation
 - *CS 5642 Advanced Animation
 - *CS 5780 Empirical Methods in Machine Learning and Data Mining
 - *INFO 3450 Human-Computer Interaction Design
 - *INFO 4400 Advanced Human-Computer Interaction Design
 - INFO 4500 Language and Technology
- Up to two courses from another track.

Dance track. In addition to the core course, DANCE 1540 (for description, see CS 1610), any five of the following. Note that some of these courses have DANCE pre- and/or corequisites. Note also that for this track, two courses marked * should be taken, and they should not be I and II of any one series for the purposes of satisfying the * requirement.

- †DANCE 2430/VISST 2430 Hip-Hop, Hollywood, and Home Movies
- †DANCE 2500/VISST 2711 Beginning Dance Composition
- †DANCE 3500 Intermediate Dance Composition I
- †DANCE 3510 Intermediate Dance Composition II
- †*DANCE 3550 Techno Soma Kinesics
- †DANCE 3660/THETR 3620 Lighting Design Studio I
- *DANCE 3560/MUSIC 3441/THETR 3690 Interactive Performance Technology

- †DANCE 3570 Media Arts Studio
 - *DANCE 3680/MUSIC 3431/THETR 3680 Sound Design and Digital Audio
 - †DANCE 4500 Advanced Dance Composition I
 - †DANCE 4510 Advanced Dance Composition II
 - †*DANCE 4550 Techno Soma Kinesics II
 - †DANCE 4660/THETR 4620 Lighting Design Studio II
 - †*MUSIC 3421 Scoring the Moving Image
 - †PSYCH 3050/VISST 3305 Visual Perception
 - *THETR 3650 Automated Lighting and Control
- Up to two courses from another track.

Film track. In addition to the core course, FILM 1750, any five of the following. Note that some of these courses have FILM pre- and/or corequisites.

- [†ART 1700 Visual Imaging in the Electronic Age]
 - [†ART 2702 Digital Video and Sound]
 - *ART 2703/CS 5640 Computer Animation
 - *CS 5642 Advanced Computer Animation
 - FILM 3250 Animation: History and Practice
 - †FILM 3770 Introduction to 16mm and Digital Filmmaking
 - †FILM 4220 Cinematography
 - †FILM 4770 Intermediate Film and Video Projects: Documentary and Experimental Workshop
 - †FILM 4930 Advanced Film and Video Projects
 - *THETR 3680 Sound Design and Digital Audio
 - †*THETR 3690 Digital Performance
- Up to two courses from another track.

Music track. In addition to the core course, MUSIC 1465, any five of the following. Note that some of these courses have MUSIC prerequisites.

- *†CIS 3000 Introduction to Computer Game Design
 - †*MUSIC 1421 Introduction to Computer Music
 - MUSIC 2111/PHYS 1204 Physics of Musical Sound
 - †*MUSIC 2421 Computers in Music Performance
 - †MUSIC 3111/3112/3113 Jazz Improvisation (any two of these 2-credit courses)
 - †*MUSIC 3421 Scoring the Moving Image
 - *MUSIC 3431/THETR 3680 Sound Design and Digital Audio
 - †*MUSIC 3441/THETR 3690 Interactive Performance Technology
 - †MUSIC 4101 Counterpoint
 - †MUSIC 4103 Topics in Post-Tonal Theory and Analysis
 - †MUSIC 4111 Composition
 - †MUSIC 4122 Orchestration
- Up to two courses from another track.

Psychology track. In addition to the core course, PSYCH 1650, any five of the following. Note that some of these courses have PSYCH prerequisites.

- †ART 1700 Visual Imaging in the Electronic Age (also ARCH 4508, CIS/CS/ENGRI 1620)
- *CS 4620 Introduction to Computer Graphics
- *INFO 2140/PSYCH 2140 Cognitive Psychology
- †*MUSIC 1421 Introduction to Digital Music
- †MUSIC 4181/PSYCH 4180 Psychology of Music

- PSYCH 2050 Perception
 - †PSYCH 3050 Visual Perception
 - PSYCH 3160 Auditory Perception
 - *PSYCH 3420 Human Perception: Applications to Computer Graphics, Art, and Visual Display
- Up to two courses from another track.

CZECH

See "Department of Russian."

DANCE

See "Department of Theatre, Film, and Dance."

DUTCH

See "Department of German Studies."

EARTH AND ATMOSPHERIC SCIENCES

L. D. Brown, chair; Arthur T. DeGaetano, associate chair (CALS); director of undergraduate studies, J. L. Cisne (Science of Earth Systems); M. W. Wysocki (Atmospheric Sciences); R. W. Allmendinger, W. D. Allmon, C. Andronicos, L. M. Cathles, J. L. Cisne, A. T. DeGaetano, L. A. Derry, P. J. Gierasch, M. Goman, C. H. Greene, D. L. Hysell, T. E. Jordan, R. W. Kay, S. Mahlburg Kay, R. Lohman, N. Mahowald, B. Monger, A. Moore, J. Phipps Morgan, M. Pritchard, S. J. Riha, W. M. White, D. S. Wilks

Science of Earth Systems (SES)

Offered by the Department of Earth and Atmospheric Sciences

Contact: 2124 Snee Hall, 255-5466, www.eas.cornell.edu

The **Earth Sciences** have never been more critical to society than they are today. Global warming, dwindling energy resources, inadequate water supplies, political strife over strategic minerals, and megadisasters threatened by volcanic eruptions, earthquakes, tsunamis, and hurricanes: these are but a few of the headlines that appear with increasing frequency. The Department of Earth and Atmospheric Sciences at Cornell is a global leader in research directed toward understanding the fundamental processes that have shaped our planet, and is committed to providing Cornell students with the earth literacy needed to serve as informed citizens and wise stewards of the Earth. EAS faculty members and graduate students carry out frontier research on both basic and applied aspects of subjects as diverse as satellite monitoring of volcanic activity, the deep structure of the Andes and Tibetan Plateau, the nature of the earth's ionosphere, and the impact of aerosols on global climate.

The Science of Earth Systems (SES) major is the undergraduate program offered by EAS to Cornell students in the Colleges of Engineering, Arts and Sciences, and Agriculture and Life Sciences. Students in this program can pursue education and research that prepares them to

compete for careers or graduate study at leading institutions in this country and abroad. Students may choose to focus on one of a number of disciplinary specialties, such as geophysics or tectonics, or develop the broad expertise needed to understand the interactions between the diverse elements of earth and life in the past, present, and future. By analyzing the complex relations among the ocean, solid earth, atmosphere, and biosphere, students can help meet society's growing demand for energy, minerals, and clean water as well as contribute to mitigating the negative impacts related to global warming, rising sea level, natural hazards, and decreasing biodiversity.

The SES program is unique in that it incorporates the fundamentals of Earth Science with the emergence of a new and more complete approach that encompasses all components of the earth system—air, life, rock, and water—to gain a new and more comprehensive understanding of the world as we know it.

To achieve a complete understanding of these important issues, students must have a desire to take a very hands-on approach. An abundance of opportunities exist for geological, oceanographic, and meteorological research in the field and for nationwide and international travel, as well as paid research experience. Students have worked with faculty members in the Andes, the Aleutians, the Rocky Mountains, the Atacama Desert, the Caribbean, Tibet, and Hawaii, and have spent a semester at sea in the Woods Hole Ocean Studies Program. Students are also able to probe the ionosphere of Earth and the surface of Mars by utilizing techniques in remote sensing.

The SES major provides a strong preparation for graduate school in any one of the earth sciences, such as atmospheric sciences, geological sciences, geophysics, geochemistry, oceanography, hydrology, and biogeochemistry. Students seeking employment with the B.A. or B.S. degree will have many options in a wide variety of careers related to energy, the environment, and critical resources in both the private sector and government. Students with the strong science background provided by the SES major are also highly valued by graduate programs in environmental law, public affairs, economics, and public policy.

Requirements for the Science of Earth Systems major

1. Basic Math and Sciences

This part of the SES curriculum builds a strong and diverse knowledge of fundamental science and mathematics, providing the student with the basic tools needed in upper-level science classes.

- MATH 1110–1120 (or MATH 1910–1920)
- PHYS 1112–2213 (or PHYS 2207–2208)
- CHEM 2070–2080, or CHEM 2090–2080, or CHEM 2070–1570
- BIOLOGY—three options:
 - one year of biology, choosing from the introductory biology sequences of courses: BIOG 1101/1103-1102/1104, or 1105/1106, or BIOG 1109/1110
 - one semester from the introductory biology sequences of courses (listed in option 1) and EAS/BIOEE 1540 or EAS 1700

iii. students may substitute (with written permission of their advisor) one semester of biology with an additional semester of chemistry, math, or physics.

- The required introductory course in earth science, EAS 2200 The Earth System.
- SES Core Courses: The core courses emphasize the interconnectedness of the Earth system, and are founded on the most modern views of the planet as an interactive and ever-changing system. Each crosses the traditional boundaries of disciplinary science. Three courses selected from the following four core courses are required for the major.
 - EAS 3010 Evolution of the Earth System
 - EAS 3030 Biogeochemistry
 - EAS 3040 Interior of the Earth
 - EAS 3050 Climate Dynamics
- Concentration Courses: The concentration(s) requirement is achieved by four intermediate to advanced-level courses (3000 level and up) that build on the core courses and have prerequisites in the required basic sciences and/or mathematics courses. Note that additional basic math and science courses may be required to complete the concentration(s) courses, depending upon the student's choice of concentration(s). The concentration(s) courses build depth and provide the student with a specific expertise in some facet of Earth system science. Four concentration(s) are defined for the major: geological sciences, biogeochemistry, atmospheric sciences, and ocean sciences. Other concentration(s) can be tailored to a student's interests in concert with the student's advisor and approval of the curriculum committee. The concentration(s) should be chosen during the junior year or before in consultation with the student's advisor and the approval of the Director of Undergraduate Studies.
- Field/Observation/Laboratory Experience: Exposure to the basic observations of earth science, whether directly in the field, or indirectly by various techniques of remote sensing or in the laboratory, is necessary to understand fully the chosen area of concentration(s). Means of satisfying this requirement generally include 3 credits of course work. Possibilities for fulfilling the field/observation requirement include the following:
 - Courses in the Hawaii Environmental Semester program;
 - Courses given by the Shoals Marine Laboratory;
 - EAS 2500 Meteorological Observations and Instruments;
 - EAS 3520 Synoptic Meteorology I;
 - EAS 4170 Field Mapping in Argentina;
 - EAS 4910 and/or 4920 Undergraduate Research, with appropriate choice of project;
 - Field courses taught by another college or university (3-credit minimum).

For more information contact John Cisne, Department of Earth and Atmospheric Sciences, john-cisne@cornell.edu, and visit the web site: www.eas.cornell.edu.

Honors. An honors program is offered by the Department of Earth and Atmospheric Sciences for superior students. Candidates for honors must maintain an overall 3.0 GPA, a cumulative average of 3.5 in the major, and complete an honors thesis (usually through EAS 4910 and/or 4920). Students interested in applying should contact the director of undergraduate studies during the second semester of the junior year or early in the first semester of the senior year.

Courses

EAS 1101 Introductory Geological Sciences (To Know Earth) (PBS)

Fall. 3 credits. C. Andronicos and R. Allmendinger.

Designed to enhance an appreciation of the physical world. Emphasizes natural environments, surface temperatures, and dynamic processes such as mountain belts, volcanoes, earthquakes, glaciers, and river systems. Interactions of the atmosphere, hydrosphere, biosphere, and lithosphere (earth system science). Water, mineral, and fuel resources; environmental concerns. Field trips in the Ithaca region.

EAS 1108 Earth in the News (PBS)

Summer. 3 credits. S. L. Losh.

Provides an introduction to physical geology and earth systems science and explores the scientific basis for informed decision making regarding many timely environmental issues, including global warming; water pollution and use; geologic hazards such as floods, earthquakes, and volcanoes; fossil fuel distribution and use; and land use. A field trip is taken in the Ithaca area.

EAS 1109 Dinosaurs

Fall. 1 credit. J. L. Cisne.

An introductory survey course for anyone interested in dinosaurs. Lectures examine the fossil evidence and illustrate how various geological and biological disciplines contribute to understanding dinosaurs and their world.

EAS 1150 Severe Weather Phenomena (PBS)

Summer. 3 credits. M. W. Wysocki.

An understanding of important aspects of severe weather will be explored including snowstorms/lake effect snow, windstorms, tornadoes, thunderstorms, tropical cyclones, El Niño, floods, drought, and heat waves.

EAS 1190 Fossil Preparation

Fall. 1 credit. Prerequisite: EAS 1109 or related EAS course. W. Allmon and J. Cisne.

Hands on experience in the preparation and curation of fossils in laboratories at the Paleontological Research Institution (PRI). Students provide own transportation to the Museum of the Earth via public transit or other means. Activities include preparation and study of vertebrate, invertebrate, and plant specimens; sorting of bulk material such as field collections and mastodon dung, and curation of prepared specimens.

EAS 1220 Earthquake! (also ENGRI 1120) (PBS)

Spring. 3 credits. L. Brown.

Explores the science of natural hazards, their societal impacts, and means of mitigation. The focus is on earthquakes, volcanoes, and tsunamis, but hurricanes, severe weather, climate change, landslides, wildfires, and the threat of extinction from a future impact by an extraterrestrial body are also considered.

EAS 1310 Basic Principles of Meteorology (PBS)

Fall. 3 credits. M. W. Wysocki.

Simplified treatment of the structure of the atmosphere: heat balance of the Earth; general and secondary circulations; air masses, fronts, and cyclones; and hurricanes, thunderstorms, tornadoes, and atmospheric condensation. The optional 1-credit laboratory for this course is offered as EAS 1330.

EAS 1330 Basic Meteorology Lab

Fall. 1 credit. Corequisite: EAS 1310. M. W. Wysocki.

This course is required for atmospheric science majors, but is optional for other students taking EAS 1310.

EAS 1340 Weather Analysis and Forecasting

Spring. 1 credit. Prerequisites: EAS 1310 and EAS 1330. S-U grades only. M. W. Wysocki and staff.

This course will serve as an extension of the EAS 1330 first-year majors lab. It will provide opportunity for formal weather briefings, explore specific atmospheric storms (synoptic and mesoscale, including the climatology of each storm type), through assigned readings, map analysis, and weather discussions.

EAS 1400 Freshman Writing Seminar "Writing in the Sciences: Environmental Perspectives"

Spring. 3 credits. S. Jessup.

This course is a Freshman Writing Seminar in which students examine interactions between humans and the natural environment from individual, societal, and scientific perspectives. Readings include a brief historical survey of humanity's role within the natural world and short readings about current environmental issues. Includes a research project where each student explores a current environmental issue.

EAS 1540 Introductory Oceanography, Lecture (also BIOEE 1540) (PBS)

Fall, summer. 3 credits. Fall: C. H. Greene and B. C. Monger; summer: B. C. Monger.

Intended for both science and nonscience majors. Covers the basic workings of the ocean including its physics, chemistry, and biology. Following this basic description, the course examines threats to the health of the ocean and the important role the ocean plays in global climate change. Nonscience majors should pay particular attention to this course to fulfill a science requirement, because they learn broadly how the earth works (physically, chemically and biologically) in just a single class.

EAS 1550 Introductory Oceanography, Laboratory (also BIOEE 1550)

Fall. 1 credit. Corequisite: EAS 1540. B. C. Monger and C. H. Greene.

Laboratory course covering topics presented in EAS/BIOEE 1540.

EAS 1551 Introduction to Oceanography, Laboratory (also BIOSM 1551)

Summer. 1 credit. Prerequisites: college level science course, or EAS 1540, or marine science course or permission of instructor. B. Monger and C. Greene.

Laboratory course covering topics presented in EAS/BIOEE 1540, but presented in the field on Appledore Island, Maine at the Shoals Marine Laboratory. Topics/activities include Plankton Tow, CDT casts, water bottle sampling, chlorophyll analysis, nutrient chemistry analysis, satellite remote sensing in the Gulf of Maine, data acquisition, data processing, data analysis, and display.

EAS 1700 Evolution of the Earth and Life (PBS)

Spring. 3 credits. J. L. Cisne.

Earth systems and their evolution; Earth history's astronomical context; plate tectonics, continental drift, and their implications for climate and life; co-evolution of life and the atmosphere; precedents for ongoing global change; dinosaurs, mass extinctions, and human ancestry. Includes laboratories on reconstructing geological history and mapping ancient geography. Fossil collecting on field trips.

EAS 2130 Marine and Coastal Geology (PBS)

Summer. 4 credits. Prerequisite: introductory geology or ecology or permission of instructor. Staff.

A special two-week course offered at Cornell's Shoals Marine Laboratory (SML), located on an island near Portsmouth, N.H. For more details and an application, contact SML office, G14 Stimson Hall.

EAS 2200 The Earth System (PBS)

Fall, spring. 4 credits. Letter grades only. W. M. White.

Integrated introduction to the earth system stressing the biological, chemical, geological, and physical interactions among the atmosphere, ocean, and solid earth. Topics include biogeochemical cycles, climate dynamics, and the evolution of the atmosphere, biosphere, cryosphere (ice), hydrosphere (oceans and inland waters), and lithosphere (solid earth).

[EAS 2220 Seminar—Hawaii's Environment

Fall. 1 credit. S-U grades only. Next offered 2010–2011. A. Moore.

For students interested in the unique environmental systems of the Hawaiian Islands. Designed to bring together students returning from field studies in Hawaii with students interested in going there to study.]

EAS 2500 Meteorological Observations and Instruments

Fall. 4 credits. Prerequisite: EAS 1310. M. W. Wysocki.

Covers methods and principles of meteorological measurements and observations including surface, free-air, and remote systems. Also covers instrument siting, mounting, and protection; instrument response characteristics, calibration, and standardization; and recorders and data logging systems. Laboratory exercises are in observation and data analysis.

EAS 2680 Climate and Global Warming (PBS)

Spring. 3 credits. Prerequisite: basic college math. S-U or letter grades. A. T. DeGaetano.

Familiarizes students from a range of disciplines with such contemporary issues in climatology as global warming and El Niño. Introduces the natural greenhouse effect, past climates, observed and projected climate changes and impacts. Also covers natural climate variations (e.g., El Niño) and their consequences and predictability. Readings focus on recent scientific findings to climate change.

EAS 2900 Computer Programming and Meteorology Software

Spring. 3 credits. Prerequisite: EAS 1310, MATH 1110, or equivalent. N. Mahowald and B. Belcher.

EAS 2960 Forecast Competition

Fall and spring. 1 credit; students enroll for two consecutive semesters; credit awarded after second semester; may be repeated for credit. Prerequisite: undergraduate standing in atmospheric science or permission of instructor. S-U grades only. D. S. Wilks.

Two-semester course providing daily exercise in probabilistic weather forecasting, in which students compete to forecast local weather most skillfully.

EAS 3010 Evolution of the Earth System (PBS)

Fall. 4 credits. Prerequisites: EAS 2200, MATH 1110 or 1910 and one course in chemistry. Two Saturday field trips.

T. Jordan, S. Riha, and W. Allmon.

Life activities alter the physical and chemical environment, and are altered by that environment. This interaction over very long times constitutes a co-evolution of Earth and life. Course uses modern systems, tens of thousand year old systems, and hundreds of million year old systems to illustrate principles, methods of reconstructing deep history, and the context of natural change inherent to life and earth.

EAS 3030 Introduction to Biogeochemistry (also NTRES 3030) (PBS)

Fall. 4 credits. Prerequisites: CHEM 2070 or equivalent, MATH 1120, plus a course in biology and/or geology. J. Yavitt.

Control and function of the Earth's global biogeochemical cycles. Begins with a review of the basic inorganic and organic chemistry of biologically significant elements, and then considers the biogeochemical cycling of carbon, nutrients, and metals that take place in soil, sediments, rivers, and the oceans. Topics include weathering, acid-base chemistry, biological redox processes, nutrient cycling, trace gas fluxes, bio-active metals, the use of isotopic tracers, controls on atmospheric carbon dioxide, and mathematical models. Interactions between global biogeochemical cycles and other components of the Earth system are discussed.

EAS 3040 Interior of the Earth (PBS)

Spring. 3 credits. Prerequisite: EAS 2200 or permission of instructor. C. Andronicos.

This class will investigate the geology of the solid earth with emphasis on igneous and metamorphic petrology, structure of the continents and ocean basins, and large scale tectonics. Interaction between deformation, melt generation and metamorphism will be examined as mechanisms by which the crust is differentiated from the underlying mantle. Geophysical and geochemical techniques for probing the deep interior of the earth will be investigated. Plate tectonics will be used as a unifying theme to understand processes operating in the solid earth.

EAS 3050 Climate Dynamics (PBS)

Fall. 3 credits. Prerequisites: two semesters of calculus and one of physics.

N. Mahowald.

Processes that determine climate and contribute to its change are discussed, including atmospheric radiation, ocean circulation, and atmospheric dynamics. Contemporary climate change issues are investigated and discussed in the context of natural variability of the system.

EAS 3060 Evolution of Ancient and Modern Oceans (also BIOSM 3060) (PBS)

Summer. 6 credits. Prerequisites: introductory biology (two semesters) and a college-level course in Earth Science, or permission of instructor. W. Allmon.

An intensive survey of the biological and geological history of the oceans, starting with the record of ancient oceans and life preserved in the rocks of central New York, followed by a transect and examination of the history of the Appalachian Mountains, ending with the oceanography and marine biology of the Gulf of Maine at Shoals Marine Lab.

EAS 3220 Biogeochemistry of the Hawaiian Islands (PBS)

Spring. 4 credits. Prerequisites: enrollment in Earth and Environmental Sciences Semester in Hawaii; EAS 2200, EAS 3030, or permission of instructor. L. A. Derry.

A field-oriented biogeochemistry course held on the island of Hawaii. Field, class, and laboratory work focus on how landscape age and climate strongly control biogeochemical cycling and ecosystem development in Hawaii. Other topics include succession of ecosystems, evolution of nutrient cycles, and impacts of invasive species. The class is structured around field projects, carried out both in groups and individually.

EAS 3340 Microclimatology (PBS)

Spring. 3 credits. Prerequisite: a course in physics. D. S. Wilks.

The relationship of radiant energy, temperature, wind, and moisture in the atmosphere near the ground. The interplay between physical processes of the atmosphere, plant canopies, and soil is examined with emphasis on the energy balance.

EAS 3400 Field Study of the Earth System (PBS)

Spring. 6 credits. Prerequisites: enrollment in Earth and Environmental Sciences Semester in Hawaii; one semester of calculus (MATH 1910/1920/1930 or 1110/1120) and two semesters of any of the following: PHYS 2207/2208 or 1112/2213; CHEM 2070/2080 or 2090/2080; BIOG 1101/1103–1102/1104 or 1105/1106 or 1109/1110; or equivalent course work. A. Moore.

Interdisciplinary field course covering fundamental concepts of the Earth system. Topics include global circulation patterns in the solid Earth, atmosphere, and ocean; energy and mass transfer; change and variability of Earth, atmosphere, and ocean systems; the temporal record of change preserved in the geologic record; and Earth, oceanic, and atmospheric controls on ecosystem processes. The course is project-based with students engaged in hands-on, active learning that takes advantage of local resources.

EAS 3410 Atmospheric Thermodynamics and Hydrostatics (PBS)

Fall. 3 credits. Prerequisites: one year of calculus and one semester of physics. M. W. Wysocki.

Introduction to the thermodynamics and hydrostatics of the atmosphere and to the methods of description and quantitative analysis used in meteorology. Topics include thermodynamic processes of dry air, water vapor, and moist air and concepts of hydrostatics and stability.

EAS 3420 Atmospheric Dynamics (PBS)

Spring. 3 credits. Prerequisites: MATH 2130, 2220, or 2930 or equivalent; one year of physics. Staff.

Introduction to the basic equations and techniques used to understand motion in the atmosphere, with an emphasis on the space and time scales typical of storm systems (the synoptic scale). The governing equations of atmospheric flow are derived from first principles and applied to middle latitude and tropical meteorology. Topics include balanced flow, atmospheric waves, circulation, and vorticity.

EAS 3500 Dynamics of Marine Ecosystems (also BIOEE 3500) (PBS)

Fall. 3 credits. Prerequisites: one year of calculus and a semester of oceanography (i.e., EAS 1540), or permission of instructor. Offered alternate years. C. H. Greene and R. W. Howarth.

Lecture course covering the interactions of physical and biological processes in marine ecosystems.

EAS 3510 Conservation Oceanography (also BIOEE 3510) (PBS)

Spring. 4 credits. Prerequisites: EAS 3400; enrollment in Earth and Environmental Sciences Semester in Hawaii. Recommended: oceanography course. C. H. Greene and C. D. Harvell.

Covers the interactions of physical and biological processes in marine ecosystems. Starts by looking at these processes on ocean-basin to regional scales and works down to the smaller scales relevant to individual organisms. Students are introduced to modern techniques of marine-ecosystems research, including remote sensing, oceanographic-survey methods, and experimental marine ecology. This course is field and laboratory intensive with students engaged in hands-on, active learning that takes advantage of local resources.

EAS 3520 Synoptic Meteorology I (PBS)

Spring. 3 credits. Prerequisite: EAS 3410. Corequisite: EAS 3420. M. W. Wysocki.

Study of weather map analysis and forecasting techniques by applying the principles of fluid and heat flow. Strengthens previously introduced meteorological concepts which are applied to forecasting midlatitude synoptic scale weather systems, such as cyclones, anticyclones, jet streams, fronts, and waves.

[EAS 3530 Physical Oceanography (PBS)]

Fall. 3 credits. Prerequisites: MATH 1120 or 1920, or one year of physics, or permission of instructor. Offered alternate years; next offered 2010–2011. B. C. Monger.

The course covers thermohaline and wind-driven circulation and surface-ocean boundary-layer dynamics. Mathematical expressions for describing conservation of momentum, mass, and heat in a fluid are used to explain the ocean's responses to wind and buoyancy forcing.]

EAS 4010 Fundamentals of Energy and Mineral Resources (PBS)

Fall. 3 credits. Recommended: previous course in geology. L. Cathles.

The Earth's energy and mineral resources reflect some of the most important changes and dramatic events that have punctuated earth history. Course provides an overview of resource types in the context of the Earth's atmospheric evolution, rifting, mantle convection, and hydrologic cycle. The

processes of resource accumulation are described in terms of simple chemical and physical principles and in the societal contexts of supply, demand, and sustainability.

[EAS 4040 Geodynamics (PBS)]

Spring. 3 credits. Prerequisite: calculus and calculus-based physics or permission of instructor. Offered alternate years; next offered 2010–2011. J. Phipps Morgan.

Quantitative study of the deformation, heat transport, and melting processes that have shaped the evolution of the solid Earth. Familiar physical and chemical principles and concepts are applied to the study of plate tectonics, fluid dynamics, mantle convection, melting, and mountain building.]

EAS 4050 Active Tectonics (PBS)

Spring. 3 credits. Recommended: mechanical background equivalent to EAS 4260/4880. S–U or letter grades. Offered alternate years. R. Lohman.

[EAS 4060 Marine Geology and Geophysics (PBS)]

Spring. 4 credits. Prerequisite: EAS 2200 or comparable courses; completion of some EAS classes helpful, but not required. Next offered 2010–2011. J. Phipps-Morgan.

This course will use geological, geochemical, and geophysical approaches to explore the geology of the ocean floor.]

EAS 4170 Field Mapping in Argentina (PBS)

Summer. 4 credits. Prerequisite: introductory EAS course and EAS 4260 or 3040. Offered alternate years. S. Mahlburg Kay.

Field mapping course in Argentina that fulfills field requirement for majors with interests in Geological Sciences and provides a field geological experience for others. Course consists of lectures in Buenos Aires followed by field exercises in the Sierras Pampeanas, Precordillera, and Main Cordillera Ranges of the Argentine Andes in the provinces of San Juan and Mendoza. A variety of exercises use modern techniques in the field mapping of a broad range of variably deformed sedimentary, metamorphic and igneous rocks. The course further provides an introduction to the tectonics and magmatic processes of the central Andes with emphasis on comparable processes in the U.S. Exercises are done in combination with students and faculty of the University of Buenos Aires.

[EAS 4250 European Discovery of Impacts and Explosive Volcanism]

Spring. 2 credits. Prerequisite: junior, senior, or graduate students with background in geology and permission of instructor. Letter grades only. Meets one day per week plus field trip during spring break. Fee probably charged for required weeklong field trip. Offered alternate years; next offered 2010–2011. J. Phipps Morgan and C. Andronicos.]

EAS 4260 Structural Geology (PBS)

Spring. 4 credits. Prerequisite: one semester of calculus, plus introductory geology course or permission of instructor. One weekend field trip. C. Andronicos.

The nature and origin of deformed rocks at submicroscopic to global scales. The course begins with review of elementary principles of continuum mechanics and continues with a discussion of deformation mechanisms commonly observed in earth materials. The geometry, kinematics, and mechanics of faults,

folds, are then addressed and the class ends with a description of the tectonic setting of structural families such as thrust belts, rift provinces, and zones of strike slip deformation. A weekend field trip to a region of spectacular folding and thrusting provides and opportunity to apply the concepts learned in lecture.

[EAS 4340 Exploration Geophysics (PBS)]

Fall. 3 credits. Prerequisites: MATH 1920 and PHYS 2208, 2213, or equivalent. Offered alternate years; next offered 2010-2011. L. D. Brown.

Fundamentals of subsurface imaging by geophysical methods as used in oil exploration and environmental investigations.]

[EAS 4350 Statistical Methods in Meteorology and Climatology (MQR)]

Fall. 3 credits. Prerequisites: one introductory course in each of statistics (e.g., AEM 2100) and calculus. D. S. Wilks. Statistical methods used in climatology, operational weather forecasting, and selected meteorological research applications. Includes statistical characteristics of meteorological data, including probability distributions and correlation structures. Covers operational forecasts derived from multiple regression models, including the MOS system; and forecast evaluation techniques.

[EAS 4370 Geophysical Field Methods (also ARKEO 4370) (PBS)]

Fall. 3 credits. Prerequisite: PHYS 2208 or 2213, or permission of instructor. Offered alternate years. L. D. Brown.

Field exercises using geophysical techniques to probe the subsurface.

[EAS 4400 Seminar on Climate Change Science, Impacts, and Mitigation]

Fall. 2 credits. Prerequisites: junior or higher standing. Offered alternate years; next offered 2010-2011. N. Mahowald.]

[EAS 4470 Physical Meteorology (PBS)]

Fall. 3 credits. Prerequisites: one year each of calculus and physics. Offered alternate years. A. T. DeGaetano.

Primarily a survey of natural phenomena of the atmosphere, with emphasis on their underlying physical principles. Topics include an introduction to atmospheric radiation processes; atmospheric optics and electricity; microphysical cloud processes; and principles of radar probing of the atmosphere.

[EAS 4510 Synoptic Meteorology II (PBS)]

Fall. 3 credits. Prerequisites: EAS 3410 and 3420. S. J. Colucci.

Structure and dynamics of large-scale, mid-latitude weather systems, such as cyclones, anticyclones, and waves, with consideration of processes that contribute to temperature changes and precipitation. Lab sessions involve real-time weather forecasting and the computer application of a numerical model of the atmosphere to study selected large-scale, mid-latitude weather events.

[EAS 4530 Mineralogy (PBS)]

Fall. 4 credits. Prerequisite: CHEM 2070 or 2090 or permission of instructor. S. Mahlburg Kay.

Chemical and physical properties and identification of minerals with emphasis on the rock-forming minerals that are the principal constituents of the Earth and nearby planets. Topics include internal and external crystallography, crystal chemistry, introductions to x-ray crystallography and

optical mineralogy, and a systematic examination of the structures, chemistry, and occurrence of the rock-forming minerals. Independent project includes use of electron microprobe (EPMA) and x-ray facilities.

[EAS 4540 Petrology and Geochemistry (PBS)]

Spring. 3-4 credits. Prerequisite: EAS 4530. Offered alternate years, next offered 2010-2011. R. W. Kay.

Principles of phase equilibrium as applied to igneous and metamorphic systems. Distribution of trace elements and isotopes as used to define processes and chronologies. Kinetics, reaction pathways and textural and mineralogical characterization. Geochemistry, origin and dating of igneous and metamorphic rocks as applied the formation and evolution of the earth, terrestrial planets and meteorites.]

[EAS 4550 Geochemistry (PBS)]

Fall. 4 credits. Prerequisites: CHEM 2070 or 2090 and MATH 1920 or equivalent. Recommended: EAS 3040. Offered alternate years. W. M. White.

The Earth from a chemical perspective. Covers the formation of the elements; cosmochemistry; chemical evidence regarding the formation of the Earth and solar system; trace-element geochemistry; isotope geochemistry; geochemical thermodynamics and kinetics; chemical evolution of the crust, mantle, and core; weathering and the chemistry of natural waters; chemistry of rivers and the oceans; hydrothermal systems; and ore deposition.

[EAS 4560 Mesoscale Meteorology (PBS)]

Spring. 3 credits. Prerequisites: EAS 3410 and 3420 or permission of instructor. S. J. Colucci.

[EAS 4570 Atmospheric Air Pollution (PBS)]

Fall. 3 credits. Prerequisites: EAS 3410 or thermodynamics course, and one semester of chemistry, or permission of instructor. Offered alternate years; next offered 2010-2011. M. W. Wysocki.]

[EAS 4580 Volcanology (PBS)]

Fall. 3 credits. Prerequisite: EAS 3040 or equivalent. Offered alternate years; next offered 2010-2011. R. W. Kay.

Causes of volcanism, melting in the Earth, and the origin of magmas. Physical volcanology, nature and types of volcanic eruptions and associated deposits, and eruption mechanisms.]

[EAS 4600 Late Quaternary Paleoecology (also ARKEO 4600) (PBS)]

Fall. 4 credits. Offered alternate years; next offered 2010-2011. M. Goman.

Explores topics in Late Quaternary paleoecology. The field research provides students with hands-on experience in sediment core collection; while in the laboratory students learn the basics of core description, pollen, and macrofossil analysis.]

[EAS 4610 Paleoclimate: Since the Last Ice Age (PBS)]

Fall. 3 credits. Prerequisites: EAS 2200 or permission of instructor. Offered alternate years. M. Goman.

This course examines changes and variability in climate for the last 21,000 years.

[EAS 4620 Marine Ecology (also BIOEE 4620) (PBS)]

Fall. 3 credits. Limited to 75 students.

Prerequisite: BIOEE 2610. Offered alternate years; next offered 2010-2011.

C. D. Harvell and C. H. Greene.

For description, see BIOEE 4620.]

[EAS 4700 Weather Forecasting and Analysis (PBS)]

Spring. 3 credits. Prerequisites: EAS 3520 and 4510. TBA. M. W. Wysocki.

Applied course with an opportunity to focus on weather forecasting and analysis techniques for various regions around the world. Lectures emphasize the application of student's knowledge of atmospheric dynamics, thermodynamics, and computer-data analysis to forecast the development and movement of multiscale weather systems. Students participate in weekly forecast discussions, write daily forecasts that include a synoptic discussion, quantitative precipitation forecasts, and severe-weather outlook for the forecast region, and lead class discussion on assigned readings.

[EAS 4710 Intro to Groundwater (also BEE 4710) (PBS)]

Spring. 3 credits. Prerequisite: MATH 2930 and fluid mechanics or hydrology course.

Offered alternate years; next offered 2010-2011. L. Cathles and T. Steenhuis.

Intermediate-level study of aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, groundwater hydraulics, soil water, and solute transport.]

[EAS 4750 Special Topics in Oceanography]

Fall, spring, summer. 2-6 credits, variable.

Prerequisites: one semester of oceanography and permission of instructor. Fall, spring: C. H. Greene; summer: B. C. Monger.

Undergraduate instruction and participation in advanced areas of oceanographic research. Topics change from semester to semester. Contact instructor for further information.

[EAS 4760 Sedimentary Basins (PBS)]

Spring. 3 credits. Prerequisite: EAS 3010 or permission of instructor. Offered alternate years. T. E. Jordan.

Focus on the physical characteristics of sedimentary basins, which host fossil fuels and groundwater, and can potentially store CO₂.

[EAS 4780 Advanced Stratigraphy (PBS)]

Fall. 3 credits. Prerequisite: EAS 3010 or permission of instructor. Offered alternate years; next offered 2010-2011. T. E. Jordan.

Covers modern improvements on traditional methods of the study of ages and of genetic relations among sedimentary rocks, emphasizing 3-D relationships. Introduces techniques and applications of sequence stratigraphy.]

[EAS 4790 Paleobiology (also BIOEE 4790) (PBS)]

Spring. 4 credits. Prerequisites: one year of introductory biology and either BIOEE 2740, 3730, EAS 3010, or permission of instructor. W. Allmon.

Surveys the major groups of organisms and their evolutionary histories. Intended to fill out the biological backgrounds of Earth and atmospheric science students concerning the nature and significance of the fossil record for their respective studies.

EAS 4800 Our Changing Atmosphere: Global Change and Atmospheric Chemistry (also BEE 4800) (PBS)

Fall. 3 credits. Prerequisites: CHEM 2090, MATH 1920, PHYS 1112, or equivalent, or permission of instructor. S–U or letter grades. P. G. Hess.

EAS 4820 Atmospheric Modeling

Spring. 3 credits. Prerequisite: differential equations, introductory computer background, junior standing or above, or permission of instructor. S–U or letter grades. N. Mahowald.

Climate and numerical weather prediction models are important tools for policy and science. This course describes the basic principles of the numerics in these models, including finite difference, spectral methods, and subgrid parameterizations. Included will be a discussion of numerical stability and verification of models.

[EAS 4830 Land, Water, Agriculture, and Environment (also CSS 4830) (PBS)]

Spring. 3 credits. Prerequisite: CSS 2600 or equivalent calculus. Next offered 2010–2011. H. Van Es and S. J. Riha.

For description, see CSS 4830.]

[EAS 4840 Inverse Methods in the Natural Sciences (PBS)]

Fall. 3 credits. Prerequisite: MATH 2940. Next offered 2010–2011. D. Hysell.

An exploration of solution methods for inverse problems with examples taken from geophysics and related fields, with particular attention to making inferences from inaccurate, incomplete, or inconsistent physical data.]

EAS 4870 Introduction to Radar Remote Sensing (also ECE 4870) (PBS)

Spring. 3 credits. Prerequisite: PHYS 2208 or 2213 or equivalent or permission of instructor. D. L. Hysell.

Covers the fundamentals of radar, antennas, and remote sensing. Students are exposed to the principles underlying the analysis and design of antennas used for communication and for radar-related applications. They also encounter both a mathematical and a practical description of how radars function, how their performance can be optimized for different applications, and how signals acquired by them can be processed. The objective is to familiarize students with a wide variety of radars rather than turn them into practicing radar engineers. Each topic is developed from basic principles so students with a wide variety of backgrounds are able to take the course. Emphasis is placed on radar applications in geophysics, meteorology and atmospheric sciences, astronomy and space sciences. Radar remote sensing of the Earth from spacecraft receives special attention.

EAS 4880 Global Geophysics (PBS)

Spring. 3 credits. Prerequisites: MATH 1920 (or 1120) and PHYS 2208 or 2213. Offered alternate years. M. Pritchard and R. Lohman.

Covers global tectonics and the deep structure of the solid Earth as revealed by investigations of earthquakes, earthquake waves, the Earth's gravitational and magnetic fields, and heat flow.

EAS 4910–4920 Undergraduate Research

Fall, spring. 1–4 credits. Students must complete form at 2124 Snee Hall. Staff. (J. L. Cisne, coordinator).

Introduction to the techniques and philosophy of research in the earth sciences and an

opportunity for undergraduates to participate in current staff research projects. Topics chosen in consultation with, and guided by, a staff member. A short written report is required, and outstanding projects are prepared for publication.

EAS 4940 Special Topics in Atmospheric Science (undergraduate level)

Fall, spring. 8 credits max. S–U or letter grades. Staff.

The department teaches "trial" courses under this number. Offerings vary by semester and are advertised by the department before the beginning of the semester. The same course is not offered more than twice.

EAS 4960 Internship Experience

Fall, spring. 1–2 credits. Prerequisites: EAS 3400; enrollment in Earth and Environmental Sciences Semester in Hawaii. S–U grades only. A. Moore.

During the last three and a half weeks of the semester students carry out a service learning project with a local NGO, environmental business, government agency, research lab, or educational facility. Projects are carefully designed with the student, sponsoring agency, and faculty member. A final report is required.

EAS 4970 Individual Study in Atmospheric Science

Fall or spring. 1–6 credits. S–U grades only. Students must register using independent study form. Staff.

Topics are arranged at the beginning of the semester for individual study or for group discussions.

EAS 4980 Teaching Experience in Earth and Atmospheric Sciences

Fall, spring. 1–4 credits. S–U grades only. Staff.

The student assists in teaching an EAS course appropriate to his or her previous training. The student meets with a discussion or laboratory section, prepares course materials, grades assignments, and regularly discusses course objectives and teaching techniques with the faculty member in charge of the course.

EAS 4990 Undergraduate Research in Atmospheric Science

Fall or spring. Credit TBA. S–U grades only. Students must register using independent study form. Staff.

Independent research on current problems in atmospheric science.

EAS 5000 Design Project in Geohydrology

Fall, spring; may continue over two or more semesters. 3–12 credits. Alternative to industrial project for M.Eng. students choosing geohydrology option. L. M. Cathles.

EAS 5020 Case Histories in Groundwater Analysis

Spring. 4 credits. L. M. Cathles.

Groundwater flow in a specific area, such as a proposed nuclear-waste disposal site, is analyzed in depth. Geological and resource data on the area are presented early in the course. Then the material is analyzed by students working as an engineering analysis team. Each student makes a weekly progress report and writes part of a final report. Results are presented in a half-day seminar at the end of term.

EAS 5050 Fluid Dynamics in the Earth Sciences

Spring. 3 credits. Prerequisites: MATH through 2940, PHYS through 2208 or 2214 or permission of instructor. Offered alternate years. L. Cathles and M. Wysocki.

The Earth System provides fascinating examples of fluid dynamic phenomena such as turbulent convection in the outer core; convection in the viscous mantle, which drives crustal plates and causes volcanism and earthquakes; rapid flows in the atmosphere and oceans, which impact climate; and electromagnetic effects in the solar wind and magnetosphere. This course investigates the Earth using fluid dynamics. Students in Earth Sciences will gain insights provided by fluid dynamics. Students from other fields will see spectacular applications and learn about the Earth System in a different and fundamental way.

EAS 5110 Earth System Interactions

Fall. 1 credit (S–U grades) or 2 credits (w/paper, letter grades). Prerequisite: permission of instructor. J. L. Cisne.

New ways of conceptualizing, characterizing, and measuring phenomena can be quite as important as new instruments or empirical discoveries in opening new areas to exploration or established ones to more rigorous investigation. This seminar aims to prepare seniors and beginning graduate students for independent research on Earth systems by analyzing examples ranging from epoch-making classics to work now appearing in the literature.

EAS 5220 Advanced Structural Geology I

Fall. 3 credits. Prerequisites: EAS 4260 and permission of instructor. Offered alternate years. R. W. Allmendinger and C. Andronicos.

EAS 5240 Advanced Structural Geology II

Fall. 3 credits. Prerequisites: EAS 4260 and permission of instructor. Offered alternate years. R. W. Allmendinger.

Geometry, kinematics, and mechanics of structural provinces. Concentrates on thrust belts, rift provinces, or strike-slip provinces.

EAS 5530 Advanced Petrology

Fall. 3 credits. Prerequisite: EAS 4540. Offered alternate years. R. W. Kay.

EAS 5540 Advanced Mineralogy

Spring. 3 credits. Prerequisites: EAS 4530 or permission of instructor. Offered alternate years. S. Mahlburg Kay.

Advanced crystallography and crystal chemistry of minerals and methods of their study. Intended to follow EAS 4530 or equivalent. Includes X-ray diffraction, optical and electron microprobe methods and can include other more advanced techniques. Concentration is on chemistry and structures of minerals and their use in understanding the thermal and pressure structure and evolution of the Earth and other planets. Includes an individual research project.

[EAS 5750 Planetary Atmospheres (also ASTRO 6575)]

Fall. 4 credits. Prerequisites: undergraduate physics, vector calculus. Offered alternate years; next offered 2010–2011. P. Gierasch. For description, see ASTRO 6575.]

EAS 5770 Planetary Surface Processes (also ASTRO 6577)

Spring. 3 or 4 credits. Offered alternate years. J. Bell.

For description, see ASTRO 6577.

[EAS 5780 Planet Formation and Evolution (also ASTRO 6578)]

Fall. 4 credits. Next offered 2010-2011.
J. L. Margot and M. Pritchard.
For description, see ASTRO 6578.]

[EAS 5840 Inverse Methods in the Natural Sciences]

Fall. 3 credits. Prerequisite: MATH 2940.
Next offered 2010-2011. D. L. Hysell.
An exploration of solution methods for inverse problems with examples taken from geophysics and related fields, with particular attention to making inferences from inaccurate, incomplete, or inconsistent physical data.]

EAS 5880 Advanced Methods in Radar (also ECE 5890)

Fall. 3 credits. Prerequisite: EAS 4870 or permission of instructor. D. Hysell.
This course will address the theory and practice of advanced radar techniques used for remote sensing, with emphasis placed on studying the upper atmosphere and ionosphere. Roughly the first half of the course will be devoted to incoherent scatter theory, the theory that relates the statistics of the signals scattered from an ionospheric plasma to the state variables that describe the plasma. The second half of the course will examine methods for measuring ionospheric parameters using incoherent scatter theory in concert with advanced radar modes and data analysis techniques. Students taking this course should be familiar with radar fundamentals and plasma kinetic theory.

EAS 6280 Geology of Orogenic Belts

Spring. 3 credits. Prerequisite: permission of instructor. Staff.

[EAS 6410 Analysis of Biogeochemical Systems]

Spring. 3 credits. Prerequisite: MATH 2930 or permission of instructor. Offered alternate years; next offered 2010-2011.
L. A. Derry.

Covers dynamics of biogeochemical systems; kinetic treatment of biogeochemical cycles; box models, residence time, response time; analytical and numerical solutions of model systems.]

EAS 6480 Air Quality and Atmospheric Chemistry (also MAE 6480)

Fall. 3 credits. Prerequisites: first-year chemistry and thermodynamics (or equivalent) and fluid mechanics (or equivalent); graduate standing or permission of instructor. K. M. Zhang.
Factors determining air quality and effects of air pollutants on public health, ecological systems, and global climate change.

EAS 6520 Advanced Atmospheric Dynamics (also ASTRO 7652)

Spring. 3 credits. Prerequisites: EAS 3410 and 3420 or equivalent. S. J. Colucci.

[EAS 6560 Isotope Geochemistry]

Spring 3 credits. Open to undergraduates. Prerequisite: EAS 4550 or permission of instructor. Offered alternate years; next offered 2010-2011. W. M. White.
Nucleosynthetic processes and the isotopic abundance of the elements; geochronology and cosmochronology using radioactive decay schemes.]

[EAS 6660 Applied Multivariate Statistics]

Spring. 3 credits. Prerequisites: multivariate calculus, matrix algebra, and two statistics courses. Offered alternate years; next offered 2010-2011. D. S. Wilks.]

EAS 6750 Modeling the Soil-Plant-Atmosphere System (also CSS 6750)

Spring. 3 credits. Prerequisite: CSS/EAS 4830 or equivalent. S. J. Riha.

EAS 6920 Special Topics in Atmospheric Science

Fall or spring. 1-6 credits. S-U or letter grades. Staff.
Study of topics in atmospheric science that are more specialized or different from other courses. Special topics covered depend on staff and student interests.

EAS 6930 Special Topics in Geological Sciences

Fall or spring. 1-3 credits, variable. S-U or letter grades. Staff.
Study of specialized advanced topics in the Earth sciences through readings from the scientific literature, seminars, and discussions.

EAS 7000-7990 Seminars and Special Work

Fall, spring. 1-3 credits. Prerequisite: permission of instructor. Staff.
Advanced work on original investigations in earth and atmospheric sciences. Topics change from semester to semester. Students should contact appropriate professor for more information.

EAS 7010-7020 Thesis Research

7010, fall; 7020, spring. 1-15 credits, variable. Staff.

EAS 7110 Upper Atmospheric and Space Physics

Fall or spring. 1-6 credits. Seminar course.
D. L. Hysell.

EAS 7220 Advanced Topics in Structural Geology

R. W. Allmendinger.

EAS 7310 Advanced Topics in Remote Sensing and Geophysics

M. Pritchard.

EAS 7330 Advanced Topics in Geodynamics

Spring. J. Phipps Morgan.

EAS 7500 Satellite Remote Sensing in Biological Oceanography

Summer. 3 credits. B. C. Monger.
The intensive summer course meets from 9 a.m. to 5 p.m. for a two-week period. The goal of the course is to teach participants the skills needed to work independently to acquire data sets derived from a variety of satellite sensors (SeaWiFS, MODIS, AVHRR, SeaWinds and Topex-Poseidon) and to merge these data sets to examine biological response to changes in the physical environment. Course time is split equally between lectures and computer lab work. Lectures cover the fundamentals of bio-optics, pigment algorithms, primary production algorithms and the underlying physical principals leading to the measurement of sea surface temperature, ocean wind speed and ocean topography. Computer labs focus on developing the IDL (Research Systems, Inc.) programming skills needed to process, analyze and visualize satellite image data. See the course syllabus for more details on the topics covered in this course.

EAS 7510 Petrology and Geochemistry

R. W. Kay.

EAS 7550 Advanced Topics in Geodynamics

Fall. 3 credits. J. Phipps Morgan.

EAS 7570 Current Research in Petrology and Geochemistry

S. Mahlburg Kay.

EAS 7620 Advanced Topics in Paleobiology

W. D. Allmon.

EAS 7650 Topics in Paleocology

Fall. 1 credit. S-U grades only. G. Dietl.

EAS 7710 Advanced Topics in Sedimentology and Stratigraphy

T. E. Jordan.

EAS 7730 Paleobiology

J. L. Cisne.

EAS 7750 Advanced Topics in Oceanography

C. H. Greene.

EAS 7800 Earthquake Record Reading

Fall. M. Barazangi and R. Lohman.

EAS 7810 Advanced Topics in Exploration Geophysics

L. D. Brown.

EAS 7930 Andes-Himalayas Seminar

S. Mahlburg Kay, R. W. Allmendinger, M. Pritchard, and T. E. Jordan.

EAS 7950 Low Temperature Geochemistry

1-3 credits. S-U letter grades. L. A. Derry.

EAS 7960 Geochemistry of the Solid Earth

W. M. White.

EAS 7970 Fluid-Rock Interactions

L. M. Cathles.

EAS 7990 Soil, Water, and Geology Seminar

Spring. L. M. Cathles and T. S. Steenhuis.

EAS 8500 Master's-Level Thesis Research in Atmospheric Science

Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty.
Limited to students specifically in the master's program in atmospheric science.

EAS 9500 Graduate-Level Dissertation Research in Atmospheric Science

Fall or spring. Credit by arrangement. S-U or letter grades. Hours by arrangement. Graduate faculty.
Limited to students in the atmospheric science Ph.D. program *only before* "A" exam has been passed.

EAS 9510 Doctoral-Level Dissertation Research in Atmospheric Science

Fall or spring. Credit by arrangement. S-U or letter grades. Hours by arrangement. Graduate faculty.
Limited to students admitted to candidacy in the atmospheric science Ph.D. program *after* "A" exam has been passed.

EAST ASIA PROGRAM

140 Uris Hall

Director: D. X. Warner. Academic: D. Boucher, A. Carlson, J. Chen, Z. Chen, S. G. Cochran, B. de Bary, S. Divo, G. Fields, M. Fiskejo, E. Gunn, T. J. Hinrichs, K. Hirano, J. Kanemistu, P. J. Katzenstein, J. V. Koschmann, J. M. Law, P. Liu, T. P. Lyons, S. Martin, D. McKee, R. McNeal, A. Mertha, H. Miyazaki, V. Nee, A. Pan, L. Paterson, A. Riles, B. Rusk, N. Sakai, P. S. Sangren, M. Shin, R. J. Sukle, K. Taylor, H. Wan, Q. Wang, J. Whitman, X. Xu, H. Yan, L. Zheng. Language: E. Akamatsu, M. Chapman, J. Choi, W. S. George, H. Hong, S. Ichikawa, H. Jeong, Y. Katagiri, S. Lai, N. Larson, F. Li, X. Li, C. Liao, F. L. Mehta, W. Shao, M. Song, M. Suzuki, Q. Teng, L. Xu, Y. Yamasaki. Emeritus: R. Barker, K. W. Brazell, T. C. Campbell, E. H. Jorden, T. L. Mei, C. Peterson, V. Shue, R. J. Smith, M. W. Young

Cornell's East Asia Program, charged with fostering knowledge of the histories, cultures, and contemporary affairs of East Asia (China, Japan, and Korea), serves as a cross-campus clearinghouse for information and is a focal unit for all of the university's East Asia-related students, faculty, community outreach, and public activities. Courses are offered through departments in the humanities and social sciences, business, city and regional planning, international and comparative labor relations, and rural sociology. A minor in East Asian Studies is offered in the Department of Asian Studies, and students enrolled in the minor are considered members of the East Asia Program. The program also offers a number of East Asia-related activities throughout the year, designed to promote awareness and enjoyment of East Asian cultures on the Cornell campus. Recognized as a National Resource Center (NRC) by the United States Department of Education, the Program is nationally renowned as one of the country's premier center for teaching and research on East Asia and in promoting advanced foreign language training in Mandarin, Cantonese, Korean, and Japanese; areal and international knowledge in the liberal arts and applied disciplines focused on East Asia. In addition, EAP was recently awarded a Foreign Language and Area Studies (FLAS) grant by US/ED. Together with the NRC funding, the FLAS fellowship program supports graduate students who wish to acquire a high level of competence in languages critical to the national needs of the United States and a fuller understanding of the areas, regions, or countries in which that language is used.

ECONOMICS

K. Basu, chair; T. Mitra, director of graduate studies; T. Lyons, director of undergraduate studies; T. Bar, L. Barseghyan, D. Benjamin, J. Berry, G. Besharov, L. Blume, R. Burkhauser, S. Coate, D. Easley, R. Ehrenberg, L. Falkson, G. Fields, A. Guerdjikova, G. Hay, Y. Hong, R. Kanbur, N. Kiefer, T. Lyons, M. Majumdar, K. Mertens, T. Mitra, F. Molinari, T. O'Donoghue, U. Possen, A. Razin, D. Sahn, K. Shell, V. Tsyrennikov, H. Y. Wan, Jr., J. Wissink. Emeritus: T. E. Davis, W. Isard, A. Kahn, P. D. McClelland, R. E. Schuler, G. Staller, E. Thorbecke, J. Vanek

The study of economics provides an understanding of the way economies operate and an insight into public issues. The department

offers a broad range of undergraduate courses in such fields as money and banking; international and comparative economics; econometrics; theory; history; growth and development; and the organization, performance, and control of industry.

The Major

Prerequisites

ECON 1110 and 1120 and MATH 1110 (or equivalents) are required, all with grades of C or better; MATH 1120 (or equivalent) is recommended.

ECON 3010 with a grade of C or better substitutes for 1110; ECON 3020 with a grade of C or better substitutes for 1120.

Requirements

Eight courses listed by the Department of Economics at the 3000 level or above, or approved by the student's major advisor, all with grades of C- or better. (S-U grade option is not allowed.)

These eight courses must include:

1. ECON 3130 and 3140
2. ECON 3210, or ECON 3190 and 3200 (ECON 3130, 3140, 3210 or 3190, 3200 should be completed before senior year.)
3. at least three courses from the following: ECON 3180, 3200, 3220-3990

ECON 3010 with a grade of B or better substitutes for both 1110 and 3130; ECON 3020 with a grade of B or better substitutes for both 1120 and 3140.

If ECON 3210 is applied toward the major, neither 3190 nor 3200 can be applied.

ECON 4980 and 4990 *cannot* be counted toward the eight-course requirement.

If ECON 3130 is applied to the major, ECON 3010 cannot be.

If ECON 3140 is applied to the major, ECON 3020 cannot be.

If both ECON 3670 and ECON 3680 are taken, only one can be applied to the major.

Honors Program

An honors program is currently being offered. Students should consult the director of undergraduate studies before May of their junior year for more information.

Recommended Courses

Students planning graduate work in economics should select ECON 3190-3200 rather than 3210 and should consider including some of the following courses in their majors:

ECON 3670 (Game Theoretic Methods) or ECON 3680 (Game Theory)

ECON 4160 (Intertemporal Economics)

ECON 4190 (Economic Decisions under Uncertainty)

Students planning careers in business management should consider including some of the following courses in their majors:

ECON 3330 (Financial Economics)

ECON 3510 or 3520 (Industrial Organization)

ECON 3580 (Behavioral Economics)

ECON 3610-3620 (International Trade and Finance)

ECON 4430 (Compensation, Incentives, and Productivity)

In addition to completing the economics major, such students should also consider courses in accounting and subjects such as finance, marketing, entrepreneurship, business administration, and business law. Courses in these subjects are offered by the Department of Applied Economics and Management, the School of Hotel Administration, and the Johnson Graduate School of Management.

Students planning to attend law school should consider including some of the following courses in their majors:

ECON 3510 or 3520 (Industrial Organization)

ECON 3610-3620 (International Trade and Finance)

ECON 4040 (Economics and the Law)

In addition to completing the economics major, such students should inquire at Career Services, College of Arts and Sciences, concerning recommended courses offered by other departments.

In regard to ECON 1110, 3010, and 3130, college credit applies as follows:

- a. If 3010 is taken and a grade of B or better is earned, it alone can only receive college credit.
- b. If 3010 is not taken, either or both 1110 and 3130 can receive college credit.
- c. If 3010 is taken and a grade of less than B is earned, only 3010 and 3130 can receive college credit.

In regard to ECON 1120, 3020, and 3140, college credit applies as follows:

- a. If 3020 is taken and a grade of B or better is earned, it alone can only receive college credit.
- b. If 3020 is not taken, either or both 1120 and 3140 can receive college credit.
- c. If 3020 is taken and a grade of less than B is earned, only 3020 and 3140 can receive college credit.

Courses

ECON 1001 Academic Support for ECON 1110

Fall, spring. 1 transcript credit only; cannot be used toward graduation.

Reviews lecture material presented in ECON 1110 lectures; provides problem-solving techniques, study tips, and additional problems to prepare for exams and problem sets; provides additional time for questions and discussion of concepts. Provides additional instruction for students who need reinforcement.

ECON 1002 Academic Support for ECON 1120

Fall, spring. 1 transcript credit only; cannot be used toward graduation.

Reviews lecture material presented in ECON 1120 lectures; provides problem-solving techniques, study tips, and additional problems to prepare for exams and problem sets; provides additional time for questions and discussion of concepts. Provides additional instruction for students who need reinforcement.

ECON 1110 Introductory Microeconomics (SBA-AS)

Fall, spring, winter, and summer. 3 credits. *ECON 1110 is not a prerequisite for 1120. Students may not receive credit for both ECON 1110 and HADM 1141. Students who take ECON 1110 and ECON 3130 may not receive credit for ECON 3010 or PAM 2000.*

Explanation and evaluation of how the price system operates in determining what goods are produced, how goods are produced, who receives income, and how the price system is modified and influenced by private organizations and government policy.

ECON 1120 Introductory Macroeconomics (SBA-AS)

Fall, spring, winter, and summer. 3 credits. *ECON 1110 is not a prerequisite for 1120. Students who take ECON 1120 and 3140 may not receive credit for ECON 3020.*

Analysis of aggregate economic activity in relation to the level, stability, and growth of national income. Topics may include the determination and effects of unemployment, inflation, balance of payments, deficits, and economic development, and how these may be influenced by monetary, fiscal, and other policies.

ECON 2040 Networks (also CS 2850, INFO 2040, SOC 2090) (SBA-AS)

Spring. 4 credits.

This interdisciplinary course examines network structures and how they matter in everyday life. The course examines how each of the computing, economic, sociological and natural worlds are connected and how the structure of these connections affects each of these worlds. Tools of graph theory and game theory are taught and then used to analyze networks. Topics covered include the web, the small world phenomenon, markets, neural networks, contagion, search and the evolution of networks.

ECON 2300 International Trade and Finance (SBA-AS)

Cannot be applied to ECON major.

For description, see AEM 2300.

ECON 3010 Microeconomics (SBA-AS)

Fall. 4 credits. Prerequisite: calculus. *Students who take ECON 1110 and ECON 3130 may not receive credit for ECON 3010 or PAM 2000.*

Intended for students with strong analytical skills who have not taken ECON 1110, 1120. May be used to replace both ECON 1110 and 3130 (may replace 3130 only with grade of B or better). Covers the topics taught in ECON 1110 and 3130. An introduction to the theory of consumer and producer behavior and to the functioning of the price system.

ECON 3020 Macroeconomics (SBA-AS)

Spring. 4 credits. May be used to replace both ECON 1120 and 3140 (may replace 3140 only with grade of B or better). *Students who take ECON 1120 and 3140 may not receive credit for ECON 3020.*

Prerequisite: calculus.

Intended for students with strong analytical skills who have not taken ECON 1110, 1120. Covers the topics taught in ECON 1120 and 3140. An introduction to the theory of national income determination, unemployment, growth, and inflation.

ECON 3130 Intermediate Microeconomic Theory (SBA-AS)

Fall, spring, and summer. 4 credits. *Students who take ECON 1110 and ECON 3130 may not receive credit for ECON 3010 or PAM 2000.* Prerequisites: ECON 1110-1120 and calculus.

The pricing processes in a private enterprise economy are analyzed under varying competitive conditions, and their role in the allocation of resources and the functional distribution of national income is considered.

ECON 3140 Intermediate Macroeconomic Theory (SBA-AS)

Fall, spring, and summer. 4 credits. *Students who take ECON 1120 and 3140 may not receive credit for ECON 3020.* Prerequisites: ECON 1110-1120 and calculus.

Introduces the theory of national income and determination and economic growth in alternative models of the national economy. Examines the interaction and relation of these models to empirical aggregate economic data.

ECON 3190 Introduction to Statistics and Probability (MQR)

Fall and spring. 4 credits. *Students who take ECON 3190 may not receive credit for MATH 4710 or BTRY 4080. Students who take ECON 3190 may not receive credit for MATH 4720 or BTRY 4090.* Prerequisites: ECON 1110-1120 and MATH 1110-1120.

Provides an introduction to statistical inference and to principles of probability. It includes descriptive statistics, principles of probability, discrete and continuous distributions, and hypothesis testing (of sample means, proportions, variance). Regression analysis and correlation are introduced.

ECON 3200 Introduction to Econometrics (MQR)

Fall and spring. 4 credits. *Students may not receive credit for both ECON 3200 and ECON 3210.* Prerequisites: ECON 1110-1120, 3190, or equivalent.

Introduction to the theory and application of econometric techniques. How econometric models are formulated, estimated, used to test hypotheses, and used to forecast; understanding economists' results in studies using regression model, multiple regression model, and introduction to simultaneous equation models.

ECON 3210 Applied Econometrics (MQR)

Fall and spring. 4 credits. *Students may not receive credit for both ECON 3200 and ECON 3210.* Prerequisites: ECON 1110-1120 and calculus.

Provides an introduction to statistical methods and principles of probability. Topics include analysis of data, probability concepts and distributions, estimation and hypothesis testing, regression, correlation and time series analysis. Applications from economics are used to illustrate the methods covered in the course.

ECON 3230 American Economic History (also AMST 3230) # (SBA-AS)

Fall. 4 credits. Prerequisite: ECON 1110-1120 or equivalent.

Surveys problems in American economic history from the first settlements to early industrialization.

[ECON 3240 American Economic History # (SBA-AS)

Spring. 4 credits. Prerequisites: ECON 1110-1120 or equivalent. Next offered 2010-2011.

Surveys problems in American economic history from the Civil War to World War I.]

ECON 3310 Money and Credit (SBA-AS)

Fall. 4 credits. Prerequisites: ECON 1110-1120 and 3140.

A systematic treatment of the determinants of the money supply and the volume of credit. Economic analysis of credit markets and financial institutions in the United States.

ECON 3330 Financial Economics (SBA-AS)

Spring. 4 credits. Prerequisites: ECON 3130 and 3140.

Examines the theory and decision making in the presence of uncertainty and the practical aspects of particular asset markets.

ECON 3350 Public Finance: The Microeconomics of Government (SBA-AS)

Fall. 4 credits. Prerequisites: ECON 1110-1120 and 3130, or equivalent, and one semester of calculus.

Analyzes the role of government in a free market economy. Topics include public goods, market failures, allocation mechanisms, optimal taxation, effects of taxation, and benefit-cost analysis. Current topics of an applied nature vary from semester to semester.

ECON 3360 Public Finance: Resource Allocation and Fiscal Policy (SBA-AS)

Spring. 4 credits. Prerequisites: ECON 1110-1120, 3130 or equivalent and one semester of calculus. Covers the revenue side of public finance and special topics. Subjects include the federal debt, the budget, and government regulation and transfers, as well as problems like local public goods, health care, education, the hierarchy of governmental structure, plus a variety of applied problems.

ECON 3410 Labor Market Analysis (SBA-AS)

For description, see ILRLE 4400.

ECON 3440 Development of Economic Thought and Institutions

For description, see ILRLE 3440.

ECON 3470 Economics of Education

For description, see ILRLE 6470.

ECON 3510 Industrial Organization I (SBA-AS)

Fall. 4 credits. *Students may not receive credit for both ECON 3510 and AEM 4320.* Prerequisite: ECON 3130 or equivalent.

Examines markets with only a few firms (i.e., oligopolies), and the primary focus is the strategic interactions between firms. Topics include static competition in oligopolies, cartels and other forms of collusive behavior, competition between firms producing differentiated products, entry behavior, RD behavior, and government interventions in oligopoly industries (e.g., antitrust laws).

ECON 3520 Industrial Organization II (SBA-AS)

Spring. 4 credits. Prerequisite: ECON 3130 or equivalent.

Focuses primarily on the pricing decisions of firms. The course does not consider the strategic response of other firms to these pricing decisions. The pricing decisions include price discrimination, commodity bundling, pricing a product line and pricing a durable good. In addition to pricing decisions, the course considers topics associated with private information such as adverse selection,

signaling, and moral hazard. Numerous theoretical models are presented and empirical results are discussed.

ECON 3580 Behavioral Economics (SBA-AS)

Spring. 4 credits. Prerequisite: ECON 3130. Introduces students to behavioral economics, an emerging subfield of economics that incorporates insights from psychology and other social sciences into economics. Examines evidence on how human behavior systematically departs from the standard assumptions of economics, and also investigates attempts by behavioral economists to improve economic analyses.

ECON 3610 International Trade Theory and Policy (SBA-AS)

Fall. 4 credits. Prerequisites: ECON 1110–1120 and 3130.

Surveys the sources of comparative advantage. Studies commercial policy and analyzes the welfare economics of trade between countries. Some attention is paid to the institutional aspects of the world trading system.

ECON 3620 International Monetary Theory and Policy (SBA-AS)

Spring and summer. 4 credits.

Prerequisites: ECON 1110–1120 and 3140.

Surveys the determination of exchange rates and theories of balance of payments adjustments. Also explores open economy macroeconomics and analyzes some of the institutional details of foreign exchange markets, balance of payments accounting, and the international monetary system.

ECON 3670 Game Theoretic Methods (SBA-AS)

Fall. 4 credits. *Students may not receive credit for both ECON 3670 and ECON 3680.* Prerequisites: ECON 1110 or equivalent. ECON 3670 is *not* a prerequisite for ECON 3680.

Introduces students to the use of game-theoretic methods for the social sciences. This leads to an analysis of the social and political foundations of economics that prepares students to think strategically on social and economic matters and thus serves as a background for more advanced courses in economics, game theory, and related social sciences.

ECON 3680 Game Theory (MQR)

Spring. 4 credits. *Students may not receive credit for both ECON 3670 and ECON 3680.* Prerequisites: ECON 3130 and 3190. ECON 3670 is *not* a prerequisite for ECON 3680.

Studies mathematical models of conflict and cooperation in situations of uncertainty (about nature and about decision makers).

ECON 3710 Economic Development (SBA-AS)

Fall. 4 credits. Prerequisite: ECON 3130 or equivalent.

Studies the problem of sustaining accelerated economic growth in less-developed countries. Emphasizes trade-offs between growth, welfare, and equity; the legacy of colonialism; relevance of history and economic theory; problems of capital formation, economic planning and international specialization; and the interaction of industrialization, agricultural development, and population change.

ECON 3720 Applied Economic Development (SBA-AS)

Spring. 4 credits. Prerequisite: ECON 1110–1120.

Examines several special topics in the economics of developing countries. Recent topics are the concepts of development and underdevelopment, the debate over development economics, the peasant household and its place in the world economy, the debt crisis, the state vs. market debate and the role of the state in economic development, and the question of sustainable development.

ECON 4040 Economics and the Law (SBA-AS)

Spring. 4 credits. Prerequisite: ECON 1110.

Examines, through the lens of economic analysis, of legal principles drawn from various branches of law, including contracts, torts, and property. Cases are assigned for class discussion; in addition, there are several writing assignments.

ECON 4080 Production Economics and Policy (SBA-AS)

For description, see AEM 6080.

ECON 4090 Environmental Economics (SBA-AS)

For description, see AEM 4510.

ECON 4160 Intertemporal Economics (SBA-AS)

Fall. 4 credits. Prerequisite: ECON 3130.

Intended for advanced economics majors who are especially interested in economic theory. Topics include (1) review of the one good Ramsey model of optimal savings and accumulation; conditions for intertemporal efficiency in production; comparative dynamics and sensitivity analysis; (2) some earlier models of capital accumulation; the roles of present value and internal rate of return in guiding investment decisions; (3) growth, exhaustible resources; pollution and conservation; discussion of the trade-offs facing a society.

ECON 4170 History of Economic Analysis # (HA-AS)

Spring. 4 credits. Prerequisites: ECON 1110–1120 or permission of instructor.

Covers early writings in economics and their relationship to current economic analysis and policy issues. Examples include: ancient and medieval philosophers on justice in exchange; mercantilist arguments for trade protection; early theories about the effect of monetary expansion (D. Hume); the role of the entrepreneur (Cantillon); and general competitive equilibrium (the Physiocrats). The most recent reading assignment in this course is Adam Smith's *Wealth of Nations* but the emphasis is on the relationship between the precursors of Adam Smith and his *Wealth of Nations* to modern economics analysis and current efforts to answer some of the questions raised in the early writing on economics.

[ECON 4190 Economic Decisions under Uncertainty

Fall. 4 credits. Prerequisites: ECON 3130 and 3190. Next offered 2010–2011.

Provides an introduction to the theory of decision making under uncertainty with emphasis on economic applications of the theory.]

ECON 4300 Policy Analysis: Welfare Theory, Agriculture, and Trade (SBA-AS)

For description, see AEM 6300.

ECON 4340 Financial Economics, Derivatives, and Risk Management (SBA-AS)

Summer only. 4 credits. Prerequisite: ECON 3130.

Helps students understand, design, and price derivative contracts. Topics include pricing of forwards, options, and swaps; developing trading strategies with derivatives; using derivatives for financial risk management; and the importance of flexibility in various economic settings.

ECON 4370 Economics of Health Policy

For description, see PAM 4370

ECON 4380 Economics of Public Health

For description, see PAM 4380

ECON 4410 Economics of Consumer Law

For description, see PAM 3410.

ECON 4430 Compensation, Incentives, and Productivity

For description, see ILRLE 4430.

ECON 4440 Evolution of Social Policy in Britain and America

For description, see ILRLE 4440.

ECON 4450 Industrial Policy (SBA-AS)

Spring. 4 credits. Prerequisite: ECON 3130.

Highlights of the course include (1) the role of the state in an industrial society; the drive for industrialization; the prevention of de-industrialization; the views of the Nobelists—Friedman, the Libertarian vs. North, the institutionist; the original intent of *laissez-faire*; (2) the major debates—the pros and cons of the Washington Consensus (“liberalization”); IMF and “conditionality”; market failure vs. government failure as roots for crises; (3) the East Asian episodes; Komiya on the Japanese MITI—early successes/recent problems; Linsu Kim about Korean policy—are subsequent difficulties the necessary price for the early triumphs?; industrial policy without protectionism (the cases of Singapore and Penang, Malaysia)—viable approaches under the WTO rules; (4) present developments and implications; trade frictions (the export expansion of the PRC); environmental concerns.

ECON 4460 Economics of Social Security (SBA-AS)

For description, see PAM 4460.

ECON 4500 Resource Economics (SBA-AS)

For description, see AEM 4500.

ECON 4540 China and India: Growth Miracle (also AEM 4540) @ (SBA-AS)

For description, see AEM 4540.

ECON 4550 Income Distribution (SBA-AS)

For description, see ILRLE 4410.

ECON 4570 Women in the Economy (also FGSS 4460) (SBA-AS)

For description, see ILRLE 4450.

ECON 4580 Topics in 20th-Century Economic History (SBA-AS)

For description, see ILRLE 4480.

ECON 4600 Economic Analysis of the Welfare State (SBA-AS)

For description, see ILRLE 6420.

ECON 4690 China's Economy under Mao and Deng (also CAPS 4690) @ (SBA-AS)

Spring. 4 credits. Prerequisite: ECON 1110-1120 or permission of instructor.

Examines the development of the Chinese economy and the evolution of China's economic system between the early 1950s and late 1990s.

ECON 4730 Economics of Export-Led Development @ (SBA-AS)

Fall. 4 credits. Prerequisites: ECON 3130, 3140, or equivalent.

Examines the phenomenon of export-led development from both the theoretical and empirical points of view. Concentration is on experiences within the West Pacific Rim.

ECON 4740 Health, Poverty, and Inequity: A Global Perspective

For description, see NS 4570.

[ECON 4750 The Economy of India @ (SBA-AS)]

Fall. 4 credits. Prerequisite: ECON 1110-1120 or equivalent background. Next offered 2010-2011.

Presents the major economics and development problems of contemporary India and examines the country's future economic prospects. The aim is, however, to discuss these problems in their proper historical perspectives. Hence, the course starts with a brief outline of the social and political history of India. It then turns to a more detailed account of the economic history of India in two stages.]

ECON 4760 Decision Theory I (also COGST 4760, CS 5846, ECON 6760) (MQR)

Fall. 4 credits.

Research on decision theory resides in a variety of disciplines including computer science, economics, game theory, philosophy, and psychology. This course attempts to integrate these various approaches. The course is taught jointly by faculty from Game Theory and Computer Science. The course covers several areas: (1) basic decision theory. This theory, sometimes known as "rational choice theory," is part of the foundation for the disciplines listed above. It applies to decisions made by individuals or by machines; (2) the limitations of and problems with this theory. Issues discussed here include decision theory paradoxes revealed by experiments, cognitive and knowledge limitations, and computational issues; (3) new research designed in response to these difficulties. Issues covered include alternative approaches to the foundations of decision theory, adaptive behavior and shaping the individual decisions by aggregate/evolutionary forces and more computationally based approaches.

ECON 4770 Decision Theory II (also COGST 4770, CS 5847, ECON 6770) (MQR)

Spring. 4 credits. Prerequisite: ECON 4760 or 6760 or CS 5846.

A continuation of ECON 4760.

ECON 4980 Independent Study in Economics

Fall or spring. Variable credit.

Independent study.

ECON 4990 Honors Program

Fall and spring. 8 credits. Prerequisites: ECON 3130, 3140, 3210 (or 3190-3200).

Students should consult the director of undergraduate studies for details. Admission is competitive. Interested students should apply to the program in the spring semester of their junior year.

Graduate Courses and Seminars**ECON 6090 Microeconomic Theory I**

Fall. 4 credits.

Topics in consumer and producer theory.

ECON 6100 Microeconomic Theory II

Spring. 4 credits.

Topics in consumer and producer theory, equilibrium models and their application, externalities and public goods, intertemporal choice, simple dynamic models and resource depletion, choice under uncertainty.

ECON 6110 Microeconomic Theory III

Fall. 4 credits. Prerequisites: ECON 6090 and 6100.

This class is part of a three-semester sequence in microeconomic theory. It provides a rigorous underpinning of partial equilibrium competitive analysis and reviews theories of noncompetitive markets, including Bertrand, Cournot, and monopolistic competition. It covers the classical sources of market failure (public goods, externalities, and natural monopoly) and discusses market failures stemming from informational asymmetries. It also provides an introduction to contract theory, bargaining theory, social choice theory, and theory of mechanism design.

ECON 6130 Macroeconomic Theory I

Fall. 4 credits.

Covers the following topics: static general equilibrium; intertemporal general equilibrium; infinitely lived agents models and overlapping generations models; welfare theorems; equivalence between sequential markets and Arrow-Debreu Markets; Ricardian proposition; Modigliani-Miller theorem; asset pricing; recursive competitive equilibrium; the Neoclassical Growth Model; calibration; and introduction to dynamic programming.

ECON 6140 Macroeconomic Theory II

Spring. 4 credits.

Covers the following topics: dynamic programming; stochastic growth; search models; cash-in-advance models; real business-cycle models; labor indivisibilities and lotteries; heterogeneous agents models; optimal fiscal and monetary policy; sustainable plans; and endogenous growth.

ECON 6170 Intermediate Mathematical Economics I

Fall. 4 credits. Prerequisites: calculus II and intermediate linear algebra.

Covers selected topics in Matrix algebra (vector spaces, matrices, simultaneous linear equations, characteristic value problem), calculus of several variables (elementary real analysis, partial differentiation, convex analysis), classical optimization theory (unconstrained maximization, constrained maximization).

ECON 6190 Econometrics I

Fall. 4 credits. Prerequisite: ECON 3190-3200 or permission of instructor.

Gives the probabilistic and statistical background for meaningful application of econometric techniques. Topics include probability theory probability spaces, random variables, distributions, moments, transformations, conditional distributions, distribution theory and the multivariate normal

distribution, convergence concepts, laws of large numbers, central limit theorems, Monte Carlo simulation; statistics: sample statistics, sufficiency, exponential families of distributions. Further topics in statistics are considered in ECON 6200.

ECON 6200 Econometrics II

Spring. 4 credits. Prerequisite: ECON 6190.

A continuation of ECON 6190 (Econometrics I) covering statistics: estimation theory, least squares methods, method of maximum likelihood, generalized method of moments, theory of hypothesis testing, asymptotic test theory, and nonnested hypothesis testing; and econometrics: the general linear model, generalized least squares, specification tests, instrumental variables, dynamic regression models, linear simultaneous equation models, nonlinear models, and applications.

ECON 6410 Health Economics I

For description, see PAM 6410.

ECON 6480 Economic Analysis of the University

For description, see ILRLE 6480.

ECON 6760 Decision Theory I (also COGST 4760, CS 5846, ECON 4760)

For description, see ECON 4760.

ECON 6770 Decision Theory II (also COGST 4770, CS 5847, ECON 4770)

For description, see ECON 4770.

ECON 6920 Health Economics II

For description, see PAM 6920.

ECON 6990 Readings in Economics

Fall or spring. Variable credit.

Independent study.

ECON 7030 Seminar in Peace Science

Fall. 4 credits.

Topics covered at an advanced level are: game theory, coalition theory, bargaining and negotiation processes, cooperative procedures, microbehavior models, macrosocial processes, and general systems analysis.

ECON 7100 Stochastic Economics: Concepts and Techniques

Spring. 4 credits. Prerequisites: ECON 6090, 6100, 6130, 6140, 6190, and 6200.

Reviews a number of techniques that have been useful in developing stochastic models of economic behavior. These include discrete-time Markov processes, dynamic programming under uncertainty, and continuous-time diffusion processes. Examples of economic models are drawn from recent literature on optimal capital accumulation and optimal savings and portfolio selection problems; permanent income hypothesis; and dynamic models of price adjustment. Advanced graduate students contemplating work in economic theory and econometric theory gain exposure to current research.

ECON 7120 Advanced Macroeconomics

4 credits. Prerequisites: ECON 6130, 6140.

Introduces students to some of the topics and analytic techniques of current macroeconomic research. The course has three parts: dynamic programming, new Keynesian economics, and recent theories of economic growth. The dynamic programming section includes models of consumption, investment, and real business cycles. The new Keynesian section covers models of wage and price rigidity, coordination failure, and credit markets. The section on endogenous growth looks at recent efforts to add nonconvexities to models of

optimal growth. These topics are intended to complement the material on overlapping generations covered elsewhere.

ECON 7130 Advanced Macroeconomics II
Spring. 4 credits. Prerequisites: ECON 6130, 6140.

Reviews the most recent research in endogenous growth theory. This theory is little more than a decade old, but it has produced a large number of both empirical and theoretical results that have substantially reshaped the general field of macroeconomics. It is perhaps no exaggeration to say that most of the work at the frontier of today's macroeconomics belongs to this field. An increasing number of papers have been touching important issues such as learning by doing, RD investment, market structure, private and public organization of RD, education financing, human capital accumulation, technological unemployment, growth and business cycles, inequality and growth, political equilibrium, democracy and growth, instability, social conflict, capital accumulation, intergenerational and vested interests and barriers to technology adoption, international transfers of technologies, and sustainable development. This course aims to orient the student in this large and variegated literature consisting of recently published articles and working papers. Understanding this literature is a sound training in the analytical methods used at the frontier of theoretical research, but it also provides a number of empirical results at the center of the economic debate.

ECON 7140 Empirical Macroeconomics
Spring. 4 credits. Prerequisites: ECON 6130 and 6140.

Advanced graduate-level course emphasizing empirical applications. Students learn how to deal with data and how to estimate and test macroeconomic theories, and can develop research topics in applied macroeconomics for their dissertations.

ECON 7170 Mathematical Economics
4 credits. Prerequisites: ECON 6090–6100 (or equivalent training in micro theory) and MATH 4130–4140 (or equivalent training in analysis).

The primary theme of this course is to explore the role of prices in achieving an efficient allocation of resources in dynamic economies. Some of the classical results on static equilibrium theory and welfare economics on attaining optimal allocation through decentralized organizations are examined through an axiomatic approach. Some basic issues on capital theory are also analyzed.

[ECON 7180 Topics in Mathematical Economics]
Spring. 4 credits. Next offered 2010–2011.]

ECON 7190 Advanced Topics in Econometrics I
Fall. 4 credits. Prerequisite: ECON 6190–6200 or permission of instructor.
Covers advanced topics in econometrics, such as asymptotic estimation and test theory, robust estimation, Bayesian inference, advanced topics in time-series analysis, errors in variable and latent variable models, qualitative and limited dependent variables, aggregation, panel data, and duration models.

ECON 7200 Advanced Topics in Econometrics II
Spring. 4 credits. Prerequisite: ECON 6190–6200 or permission of instructor.
For description see ECON 7190.

ECON 7230 Semi/Non Parametric Econometrics

Fall. 4 credits. Prerequisite: ECON 6190–6200 or permission of instructor.
Analyzes the ways identification problems limit the conclusions that may be drawn in empirical economic research and studies how identified and partially identified parameters can be estimated. In the first part of the course, the focus is on nonparametric models. Ways data can be combined with weak assumptions to yield partial identification of population parameters are discussed.

ECON 7310 Monetary Economics
Spring. 4 credits. Prerequisites: ECON 6140 or permission of instructor.

Covers advanced topics in monetary economics, macroeconomics, and economic growth—such as overlapping-generations, taxes and transfers denominated in money, transactions demand for money, multi-asset accumulation, exchange rates, and financial intermediation.

ECON 7320 Monetary Economics
Fall. 4 credits. Prerequisites: ECON 7310 or permission of instructor.

Covers advanced topics in monetary economics, macroeconomics, and economic growth—such as economic volatility, the “burden” of government debt, restrictions on government borrowing, dynamic optimization, endogenous growth theory, technological evolution, financial market frictions, and cyclical fluctuations.

ECON 7350 Public Finance: Resource Allocation and Fiscal Policy (also AEM 7350)

Fall. 4 credits.
Develops a mathematical and highly analytical understanding of the role of government in market economies and the fundamentals of public economics and related issues. Topics include generalizations and extensions of the fundamental theorems of welfare economics, in-depth analysis of social choice theory and the theory on implementation in economic environments, public goods and externalities and other forms of market failure associated with asymmetric information. The theoretical foundation for optimal direct and indirect taxation is also introduced along with the development of various consumer surplus measures and an application to benefit cost analysis. Topics of an applied nature vary from semester to semester depending on faculty research interests.

ECON 7360 Public Finance: Resource Allocation and Fiscal Policy
Spring. 4 credits.

Spends a large part of the semester covering the revenue side of public finance. Topics include the impact of various types of taxes as well as the determination of optimal taxation. The impact of taxation on labor supply, savings, company finance and investment behavior, risk bearing, and portfolio choice are explored. Other topics include the interaction of taxation and inflation, tax evasion, tax incidence, social security, unemployment insurance, deficits, and interactions between different levels of government.

ECON 7380 Public Choice
Spring. 4 credits. Prerequisites: ECON 6090, 6100.

This course has two parts. It begins with an introduction to economic theories of political decision making. Reviews the theory of voting,

theories of political parties and party competition, theories of legislative decision making and interest group influence. Also discusses empirical evidence concerning the validity of these theories. The second part uses these theories to address a number of issues in public economics. Develops the theory of political failure, analyzes the performance of alternative political systems and discusses the problem of doing policy analysis, which takes into account political constraints.

ECON 7400 Social and Economic Data
Spring. 4 credits.
For description, see ILRLE 7400.

ECON 7420 Seminar in Labor Economics I
For description, see ILRLE 7450.

ECON 7430 Seminar in Labor Economics II
For description, see ILRLE 7460.

ECON 7470 Economics of Education I
For description, see ILRLE 7470.

ECON 7471 Economics of Education II
For description, see ILRLE 7471.

ECON 7480 Applied Econometrics I
For description, see ILRLE 7410.

ECON 7490 Applied Econometrics II
For description, see ILRLE 7420.

ECON 7510 Industrial Organization and Regulation
Fall. 4 credits. Prerequisites: ECON 6090, 6100.

Focuses primarily on recent theoretical advances in the study of industrial organization. Topics include market structure, nonlinear pricing, quality, durability, location selection, repeated games, collusion, entry deterrence, managerial incentives, switching costs, government intervention, and R&D/patents. These topics are discussed in a game-theoretic context.

ECON 7520 Industrial Organization and Regulation
Spring. 4 credits. Prerequisites: ECON 6090, 6100, 7510.

Rounds out some topics in the theory of industrial organization with the specific intent of addressing the empirical implications of the theory. Reviews empirical literature in the SCP paradigm and in the NEIO paradigm.

ECON 7560 Noncooperative Game Theory
Fall. 4 credits. Prerequisites: ECON 6090–6100 and 6190.

Surveys equilibrium concepts for noncooperative games. Covers Nash equilibrium and a variety of equilibrium, refinements, including perfect equilibrium, proper equilibrium, sequential equilibrium and more. Pays attention to important special classes of games, including bargaining games, signalling games, and games of incomplete information. Most of the analysis is from the strict decision-theoretic point of view, but also surveys some models of bounded rationality in games, including games played by automata.

ECON 7570 Economics of Imperfect Information
Spring. 4 credits. Prerequisites: ECON 6090–6100 and 6190.

Considers some major topics in the economics of uncertain information. Although the precise

topics considered vary from year to year, subjects such as markets with asymmetric information, signalling theory, sequential choice theory, and record theory are discussed.

ECON 7580 Psychology and Economic Theory

Fall, spring. 4 credits. Prerequisites: economics graduate core or permission of instructor.

Explores the ways in which insights from psychology can be integrated into economic theory. Presents evidence on how human behavior systematically departs from the standard assumptions of Economics and how this can be incorporated into modeling techniques.

ECON 7600 Topics in Political Economy

Fall. 4 credits. Prerequisite: economics graduate core or permission of instructor. Develops critiques and extensions of economic theory, taking into account the political and social moorings of economic activity and equilibria. The formation and persistence of social norms; the meaning and emergence of property rights; the role of policy advice in influencing economic outcomes; and the effect of political power and ideology on economic variables are studied. While these topics were popular in the classic works of political economy, recent advances in game theory and, more generally, game-theoretic thinking allows a new approach to these topics. Hence, the course begins by devoting some lectures to elementary ideas in game-theory and strategic analysis.

ECON 7610 International Economics: Trade Theory and Policy

Fall. 4 credits. Prerequisites: ECON 6090, 6100.

Surveys the sources of comparative advantage. Analyzes simple general equilibrium models to illustrate the direction, volume, and welfare effects of trade. Topics in game theory and econometrics as applied to international economics may be covered.

ECON 7620 International Economics: International Finance and Open Economy Macroeconomics

Spring. 4 credits. Prerequisite: ECON 7610. Surveys the determination of exchange rates and theories of balance of payment adjustments. Explores open economy macroeconomics by analyzing models of monetary economies. Topics in monetary economics and econometrics as applied to international economics are covered.

ECON 7640 International Trade and Foreign Investment

Spring. 4 credits. Prerequisites: economics graduate core.

The course will address new trade theory, introducing increasing returns, imperfect competition, and heterogeneous firms. A central part of the course will be patterns of foreign investments.

ECON 7700 Topics in Economic Development

For description, see AEM 6670.

ECON 7711 Empirical Methods for the Analysis of Household Survey Data: Applications to Nutrition, Health, and Poverty

For description, see NS 6853.

ECON 7720 Economics of Development (also ILRLE 7490)

Spring. 4 credits. Prerequisites: first-year graduate economic theory and econometrics.

Analytical approaches to the economic problems of developing nations. Topics include old and new directions in development economics thinking, the welfare economics of poverty and inequality, empirical evidence on who benefits from economic development, labor market models, project analysis with application to the economics of education, and development policy.

ECON 7730 Economic Development

Fall. 4 credits. Prerequisites: ECON 6090, 6100, and 6110.

Concerned with theoretical and applied works that seek to explain economic development, or lack thereof, in countries at low-income levels. Specific topics vary each semester.

ECON 7760 Computational Economics

Spring. 4 credits. Prerequisites: ECON graduate CORE.

Computational economics is intended to teach students how to solve problems using a computer economic model that cannot be solved analytically. It should give students a strong background for applied and empirical research

ECON 7840 Seminars in Advanced Economics

Fall and spring. 4 credits.

ECON 7850 Third-Year Research Seminar

Fall. 4 credits.

ENGLISH

E. Hanson, chair; D. Fried, director of undergraduate studies and honors (255-3492); A. Galloway, director of graduate studies (255-7989); J. Adams, E. Anker, K. Attell, F. Bogel, L. Bogel, C. Boyce-Davies, J. Braddock, M. P. Brady, L. Brown, J. Carlacio, C. Caruth, C. Chase, E. Cheyfitz, M. Cobb, B. Correll, J. Culler, S. Davis, L. Donaldson, G. Farred, D. Fried, A. Fulton, R. Gilbert, K. Gottschalk, T. Hill, M. Hite, W. Jones, J. Juffer, R. Kalas, M. Koch, J. Lennon, P. Lorenz, J. Mann, B. Maxwell, K. McClane, M. McCoy, M. K. McCullough, S. Mohanty, R. Morgan, T. Murray, R. Parker, E. Quinonez, M. Raskolnikov, C. Ruff, N. Saccamano, R. Saloman, S. Samuels, P. Sawyer, D. Schwarz, H. Shaw, L. VanClief-Stefanon, S. Vaughn, H. Viramontes, S. Wong, D. Woubshet, S. Zacher, J. Zigarovich. Emeriti: M. H. Abrams, B. Adams, J. Bishop, J. Blackall, D. Eddy, R. Elias, L. Fakundiny, L. Herrin, M. Jacobus, P. Janowitz, C. Kaske, A. Lurie, P. Marcus, D. McCall, J. McConkey, D. Mermin, S. Parrish, M. Radzinowicz, E. Rosenberg, S. Siegel, S. C. Strout, W. Wetherbee.

The Department of English offers a wide range of courses in English, American, and Anglophone literature as well as in creative writing, expository writing, and film analysis. Literature courses focus variously on close reading of texts, study of particular authors and genres, questions of critical theory and method, and the relationship of literary works to their historical contexts and to other disciplines. Writing courses typically employ the workshop method in which students develop their skills by responding to criticism of their work by their classmates as well as

their instructors. Many students supplement their formal course work in English by attending public lectures and poetry readings sponsored by the department or by writing for campus literary magazines. The department seeks not only to foster critical analysis and lucid writing but also to teach students to think about the nature of language and to be alert to both the rigors and the pleasures of reading texts of diverse inspiration.

First-Year Writing Seminars

As part of the university-wide First-Year Writing Seminars program administered by the John S. Knight Institute for Writing in the Disciplines, the department offers many one-semester courses dealing with various forms of writing (e.g., narrative, autobiographical, and expository), with the study of specific areas in English and American literature, and with the relation of literature to culture. Students may apply any of these courses to their first-year writing seminar requirement. Detailed course descriptions may be found in the first-year writing seminars program listings, available from college registrars in August for the fall semester and in November for the spring semester.

Freshmen interested in majoring in English are encouraged to take at least one of the department's 2000-level first-year writing seminars: ENGL 2700 The Reading of Fiction, ENGL 2710 The Reading of Poetry, and ENGL 2720 Introduction to Drama. These courses are open to all second-semester freshmen. They are also open, as space permits, to first-semester freshmen with scores of 700 or above on the CEEB College Placement Tests in English composition or literature, or 5 on the CEEB Advanced Placement Examination in English, as well as to students who have completed another first-year writing seminar.

Courses for Nonmajors

For students majoring in fields other than English, the department provides a variety of courses at all levels. A number of courses at the 2000 level are open to qualified freshmen, and all are open to sophomores. Courses at the 3000 level are open to all sophomores, juniors, and seniors; they are also open to freshmen who have received the instructor's prior permission. The suitability of courses at the 4000 level for nonmajors depends in part on the course topics, which are subject to change from year to year. Permission of the instructor is sometimes required; prior consultation is always strongly advised.

The Major in English

Students who major in English develop their own programs of study in consultation with their major advisors. Some choose to focus on a particular historical period or literary genre or to combine sustained work in creative writing with the study of literature. Others pursue interests in such areas as women's literature, African-American literature, literature and the visual arts, or critical theory.

The department recommends that students prepare themselves for the English major by taking one or more of its preparatory courses, such as ENGL 2700 The Reading of Fiction, ENGL 2710 The Reading of Poetry, or ENGL 2720 Introduction to Drama. (The “ENGL” prefix identifies courses sponsored by the Department of English, all of which appear in the English section of *Courses of Study* or the department’s supplementary lists of courses; it also identifies courses sponsored and taught by other academic units and cross-listed with English.) These courses concentrate on the skills basic to the English major and to much other academic work—responsive, sensitive reading and lucid, strong writing. As first-year writing seminars, any one of them will satisfy one half of the College of Arts and Science’s first-year writing requirement. ENGL 2800, 2810, 2880, and 2890 are also suitable preparations for the major and are open to students who have completed their first-year writing seminar requirement. ENGL 2010 and 2020, which together constitute a two-semester survey of major British writers, though not required, are strongly recommended for majors and prospective majors. ENGL 2010 and 2020 (unlike ENGL 2800, 2810, 2880, and 2890) are also “approved for the major” in the special sense of that phrase explained below.

To graduate with a major in English, a student must complete with a grade of C or better 10 courses (40 credit hours) approved for the English major. All ENGL courses numbered 3000 and above are approved for the major. In addition, with the exception of first-year writing seminars (ENGL 2700, 2710, and 2720), 2000-level courses in creative and expository writing (ENGL 2800, 2810, 2880, and 2890), and courses designated for nonmajors, all 2000-level ENGL courses are also approved for the major. Courses used to meet requirements for the English major may also be used to meet the distribution requirements in the College of Arts and Sciences. Many of these courses may be used to meet the college’s “historical breadth” requirement as well.

Of the 40 credits required to complete the major, 12 credits (three courses) must be from courses in which 50 percent or more of the material consists of literature originally written in English before 1800; 8 credits (two courses) must be gateway courses (2000 through 2050); 8 credits (two courses) must be at the 4000 level or above; and another 12 credits (three courses) must form an intellectually coherent “concentration.” The 4000-level and pre-1800 requirements may be satisfied only with ENGL courses, and ENGL 4930–4940, the Honors Essay Tutorial, may not be used to satisfy either one. Courses that satisfy the pre-1800 requirement are so designated in *Courses of Study*. Many English majors use ENGL 2010 or ENGL 2030 to begin meeting this requirement since these courses provide an overview of earlier periods of British and American literatures and so enable students to make more informed choices of additional pre-1800 courses. ENGL 2020 does not qualify as a pre-1800 course. Neither do courses offered by other departments unless they are cross-listed with English. Advanced courses in foreign literature may not be used to fulfill the pre-1800 requirement, but they may be used for English major credit provided they are included within the 12-credit limit described below. The three-course concentration requirement may be satisfied with any courses approved for the major. The department’s “Guide to the English Major” suggests areas of

concentration and offers examples of courses that fall within those areas, but majors define their own concentrations in consultation with their advisors.

As many as 12 credits in appropriate courses offered by departments and programs other than English may be used to satisfy English major requirements. Courses in literature and creative writing offered by academic units representing neighboring or allied disciplines (German Studies, Romance Studies, Russian, Asian Studies, Classics, Comparative Literature, Africana Studies, the Society for the Humanities, American Studies, Feminist, Gender and Sexuality Studies, Religious Studies, Asian American Studies, American Indian Studies, Latino Studies, and Theatre, Film, and Dance) are routinely counted toward the 40 hours of major credit provided they are appropriate for juniors or seniors, as are most courses at the 3000 level and above. English majors who are double majors may exercise this option even if all 12 credits are applied to their second major. All English majors are urged to take courses in which they read foreign works of literature in the original language, and for that reason 2000-level literature courses for which qualification is a prerequisite (as well as more advanced foreign literature courses) may be counted toward the English major. Credit from other non-ENGL courses may be included within the 12 credits of nondepartmental courses approved for the major only when the student is able to demonstrate to the advisor’s satisfaction their relevance to his or her individual program of study.

Planning a Program of Study

Few students know from the moment they decide to pursue a major in English exactly what they wish to study. Moreover, it is natural for interests to change in the course of time. The effort of creating or discovering a coherent pattern in the courses selected is itself a valuable part of a literary (as well as a liberal) education, and English majors are expected to discuss their overall program of study when seeking their advisors’ approval of courses each semester. While the Department leaves a great deal to the discretion of its individual majors and their academic advisers, it expects them to choose courses with an eye to breadth and variety on the one hand and focus and coherence on the other.

Students with a special interest in developing their skills as writers of verse or prose will find a variety of workshop courses in expository and creative writing. As a rule a student may not enroll in more than one such course in any given semester, although exceptions are sometimes allowed where one of these is ENGL 2880 or 2890.

A number of English majors do part of their course work at a foreign institution, usually during their junior year; some spend a single semester away from campus, others an entire year. The Cornell Abroad office has information on a variety of programs at universities around the world. Many English majors study abroad in the United Kingdom and other English speaking countries, but some choose other locations. As long as they continue to meet all College and Department requirements or can complete them upon returning to Cornell, studying abroad poses no serious problems. Students spending their entire junior year abroad will be challenged to complete the Department’s Honors program

since they will be unable to take the required Honors seminar in the junior year and should plan to take it in the spring semester of their sophomore year. Otherwise they will have to take it when they return as seniors. Students must make arrangements with the chair of the Honors Committee before leaving campus.

Credit for literature courses taken abroad can in most instances be applied to the 40-hour minimum for the English major, and to requirements like the concentration and pre-1800 requirements. Approval of requests to apply credit for study abroad to the English major is granted by the DUS rather than the academic advisor, however, and students must confer with the DUS in advance of going abroad as well as on their return. The first conference includes a review of catalogue descriptions of courses the student expects to take while abroad (along with a few alternatives), the second a presentation of transcripts or equivalent documentation of successful completion of the work proposed, together with papers and exams.

No more than 16 credits per year, or 8 credits per semester, of non-Cornell credit may be applied to the English major. This restriction applies to study abroad even when that study is conducted under Cornell auspices.

The Major in English with Honors

Second-semester sophomores who have done superior work in English and related subjects are encouraged to seek admission to the departmental program leading to the degree of bachelor of arts with honors in English. Following an interview with the chair of the Honors Committee, qualified students will be admitted provisionally to the program. During their junior year these students complete at least one honors seminar (ENGL 4910 or 4920) and are encouraged to take an additional 4000-level English course in the area of their thesis topic. On the basis of work in these and other English courses, a provisional honors candidate must select a thesis topic and secure a thesis advisor by the end of the junior year. A student who has been accepted by a thesis advisor becomes a candidate for honors rather than a provisional candidate.

During the senior year, each candidate for honors in English enrolls in a yearlong tutorial (ENGL 4930–4940) with the faculty member chosen as thesis advisor. The year’s work culminates in the submission of a substantial scholarly or critical essay to be judged by at least two members of the faculty. More information about the Honors Program may be found in a leaflet available in the English offices.

First-Year Writing Seminars Recommended for Prospective Majors

ENGL 2700 The Reading of Fiction

Fall, spring, summer. 3 credits. Each section limited to 17 students.

Recommended for prospective majors in English. *This course does not satisfy requirements for the English major.*

This course examines modern fiction, with an emphasis on the short story and novella. Students write critical essays on authors who flourished between 1870 and the present, such as James, Joyce, Woolf, Hurston, Lawrence, Fitzgerald, Hemingway, Faulkner, Rhys, Welty, Salinger, and Morrison. Reading lists vary from

section to section, and some may include a novel, but close, attentive, and imaginative reading and writing are central to all.

ENGL 2710 The Reading of Poetry

Fall, spring, 3 credits. Each sec limited to 17 students. Recommended for prospective English majors. *This course does not satisfy requirements for the English major.*

What can reading poetry teach us about writing critical essays? How can we become more perceptive and critical readers of poetry, and also better prose writers? This course deals with a rich variety of poems, including sonnets, odes, sestinas, villanelles, and songs. By engaging in discussions and working with varied writing assignments, we will explore major modes and genres of English poetry, learn about versification techniques, rhetorical strategies, and thematic and topical concerns. In the process, we will expand the possibilities of our own writing.

ENGL 2720 The Reading of Drama

Fall, spring, 3 credits. Each sec limited to 17 students. Recommended for prospective English majors. *This course does not satisfy requirements for the English major.*

In this course, we will study and write critically about plays, older and newer, in a variety of dramatic idioms and cultural traditions. We will practice close, interpretive reading of texts and pay attention to their possibilities for live and filmed performance. Readings will include works by such playwrights as Sophocles and Shakespeare, Arthur Miller and Caryl Churchill, Ntosake Shange and Tony Kushner, and some drama criticism and performance theory. Attendance at screenings and at live productions by the Theatre Department may be required.

Critical Writing and Literary Nonfiction

ENGL 2880-2890 Expository Writing (LA-AS)

Fall, spring, 4 credits. Each section limited to 16 students. Students must have completed their colleges' first-year writing requirements or have the permission of the instructor. S. Davis and staff. Website: <http://courses.cit.cornell.edu/engl2880-2890/>. *This course does not satisfy requirements for the English major.*

ENGLISH 2880-2890 offers guidance and an audience for students who wish to gain skill in expository writing—a common term for critical, reflective, investigative, and literary nonfiction. Each section provides a context for writing defined by a form of exposition, a disciplinary area, a practice, or a topic intimately related to the written medium. Course members will read in relevant published material and write and revise their own work regularly, while reviewing and responding to one another's. Since these seminar-sized courses depend on members' full participation, regular attendance and submission of written work are required. Students and instructors will confer individually throughout the term.

Fall 2009: Section 1. Making the News, J. Carluccio. Section 2. Teens Gone Wild: The Invention of Adolescence, J. Metzler. Section 3. Justice.com: Today's Technology and the Law, J. Menendez. Section 4. TV Nation: Television & Identity in America, D. Faulkner. Section 5. Apocalyptic Imaginings in Film and Fiction.

S. Davis. Section 6. Human Rights: Ideals and Realities. Z. Harivandi. Section 7. The Reflective Essay. K. Gottschalk.

ENGL 3810 Reading as Writing, Writing as Reading (LA-AS)

Fall, 4 credits. Limited to 15 students. Prerequisite: permission of instructor based on a writing sample. S. Davis.

In this course we'll read a small number of 19th- and 20th-century novels, writing frequently about them and reading one another's writing as collaborators and commentators. We'll pay attention to the way our own readings may, critically and creatively, rewrite the literary texts we read, as well as to the way writers' original literary works can be "readings" of those of other writers. This is a course for English majors and nonmajors who wish to extend their mastery of critical and interpretive prose. For 2009: Nabokov's *Pale Fire*, Brontë's *Jane Eyre*, Rhys's *Wide Sargasso Sea*, Conrad's *Heart of Darkness*, Salih's *Season of Migration to the North*, Woolf's *Mrs. Dalloway*, and Cunningham's *The Hours*. See <http://courses.cit.cornell.edu/sad4449/38101>.

ENGL 3860 Philosophic Fictions (LA-AS)

Spring, 4 credits. Limited to 15 students. Prerequisite: permission of instructor based on a writing sample. S. Davis.

"Fictions" of thought and language abound in works that deliberately test and play with ideas: dialogues, satires, parables, philosophic tales, and "thought-experiments." Students will write critically about such works and will experiment with writing in similar forms in order to argue flexibly, ridicule vice and folly, or involve readers in pleasingly or disturbingly insoluble problems. Readings may include Plato's *Phaedrus* or *Gorgias*, Swift's *Gulliver's Travels*, parables by Jesus and Kafka, dystopias by Ursula Le Guin and Caryl Churchill, science fiction by Philip K. Dick and Octavia Butler, short stories by Jorge Luis Borges and Flannery O'Connor, and essays by Richard Rorty and Jacques Derrida. See <http://courses.cit.cornell.edu/sad4449/38601>.

[ENGL 3870 Autobiography: Theory and Practice (LA-AS)]

Fall, 4 credits. Limited to 15 students. By permission of instructor on the basis of writing samples. Next offered 2010-2011. K. Gottschalk.]

ENGL 3880 The Art of the Essay (LA-AS)

Spring, 4 credits. Limited to 15 students. By permission of instructor on the basis of writing samples. Interested students should submit one or more pieces of recent writing (prose) to the instructor before the beginning of the semester, preferably at pre-enrollment.

The term "essay" means "an attempt." Thus, essays are short "attempts" to explore features of one's own experience, to pass onto the reader a very personal and often digressive reflection on some aspect of one's own personality or reflections about people which arise from that exercise, and whose subject matter provides a springboard for more self-reflection. For both English majors and nonmajors who have done distinguished work in first-year writing seminars and in 2000-level courses, and who desire intensive practice in creative nonfiction, the course assumes a high degree of self-motivation and a critical interest in the work of other writers. Students will submit a final portfolio of conceptually rich and stylistically polished writing.

Creative Writing

Students usually begin their work in Creative Writing with ENGL 2800 or 2810, and only after completion of the First-Year Writing Seminar requirement. Please note that either ENGL 2800 or ENGL 2810 is the recommended prerequisite for 3000-level creative writing courses. ENGL 2800 and 2810 may satisfy a distribution requirement in your college (please check with your college advisor). ENGL 3820-3830, 3840-3850, and 4800-4810 are approved for the English major.

ENGL 2800-2810 Creative Writing (LA-AS)

Fall, spring, summer, winter, 3 credits. Limited to 18 students. Prerequisite: completion of the First-Year Writing Seminar requirement. **Majors and prospective majors, please note:** Although recommended for prospective English majors, ENGL 2800-2810 cannot be counted toward the 40 credits required for completion of the English major. It is a prerequisite for 3000-level courses in creative writing, which count toward the major. ENGL 2800 is not a prerequisite for ENGL 2810.)

An introductory course in the theory, practice, and reading of prose, poetry, and allied forms. Students are given the opportunity to try both prose and verse writing and may specialize in one or the other. Many of the class meetings are conducted as workshops.

ENGL 3820-3830 Narrative Writing (LA-AS)

3820, fall; 3830, spring, 4 credits each semester. Each section limited to 15 students. Prerequisite: ENGL 2800 or 2810 and permission of instructor based on submission of a manuscript (bring manuscript to first day of class). Fall: sem 101, A. Koch; sem 102, R. Morgan; sem 103, H. Viramontes; Spring: H. Viramontes, J. Lennon, M. McCoy.

The writing of fiction; study of models; analysis of students' work.

ENGL 3840-3850 Verse Writing (LA-AS)

3840, fall or summer; 3850, spring, 4 credits. Each section limited to 15 students. Prerequisite: ENGL 2800 or 2810 and permission of instructor based on submission of manuscript (bring manuscript on first day of class). Fall: sem 101, A. Fulton; sem 102, TBA. Spring: K. McClane, TBA.

The writing of poetry; study of models; analysis of students' poems; personal conferences.

ENGL 4800-4810 Seminar in Writing (LA-AS)

4800, fall; 4810, spring, 4 credits each semester. Each section limited to 15 students. Prerequisite: permission of instructor, normally on the basis of a manuscript. The manuscript should be submitted to the instructor no later than the first day of class. Previous enrollment in ENGL 2800 or 2810 and at least one 3000-level writing course recommended. Successful completion of one half of the 4800-4810 sequence does not guarantee enrollment in the other half; students must receive permission of the instructor to enroll in the second course. Fall: sem 101, A. Fulton; sem 102, E. Quinonez; spring: J. Lennon and L. Van Clief-Stefanon.

Intended for those writers who have already gained a basic mastery of technique. Although ENGL 4800 is not a prerequisite for ENGL 4810, students normally enroll for both semesters and should be capable of a major project—a collection of stories or poems, a group of personal essays, or perhaps a novel—to be completed by the end of the second semester. Seminars are used for discussion of the students' manuscripts and published works that individual members have found of exceptional value.

Courses for Freshmen and Sophomores

These courses have no prerequisites and are open to freshmen and nonmajors as well as majors and prospective majors.

Gateway Courses

These courses are required for English majors, but recommended for all others.

ENGL 2000 Introduction to Criticism and Theory (LA-AS)

Fall. 4 credits. K. Attell.

This course is an introductory survey of modern methodologies in literary criticism and theory. Readings will include key texts from such schools as New Criticism, psychoanalysis, structuralism, poststructuralism, Marxism, feminism, and postcolonial studies. The purpose of the course is to give students a solid foundation in the issues, techniques, and vocabularies of advanced literary analysis.

ENGL 2010-2020 The English Literary Tradition # (LA-AS)

2010, fall; 2020, spring. 4 credits each semester. ENGL 2010, not a prerequisite for 2020, may be used as one of the three pre-1800 courses required of English majors.

2010 (fall). R. Kalas. An introduction to the study of English literature from its early history through the 17th century, emphasizing exceptional works and key periods of innovation. Readings will include *Beowulf* and *Sir Gawain and the Green Knight* in modern translation, selections from Chaucer's *Canterbury Tales*, More's *Utopia*, Book I of Spenser's *Faerie Queene*, some 16th-century sonnets, Shakespeare's *King Lear*, poems by Christopher Marlowe, Isabella Whitney, Mary Sidney, John Donne, Andrew Marvell, and George Herbert, and parts of Milton's *Paradise Lost*. We'll focus on the distinctive features of these works—their genre, meter, rhetoric, and style—while also considering what it means to think about literature as history. Class format will be lecture and discussion; short assignments will encourage close reading and experimentation with literary techniques.

2020 (spring). W. Jones. From powdered wigs and sex comedies to romantic odes to Stoppard and Rushdie: a survey of 250 years of British poetry, prose and drama that also functions as an introduction to literary study. Lectures will stress intertextual relations, historical shifts, and close reading; short reading responses and essays will explore topics of student interest. Special features of the course include an archive of recorded readings and short critical and historical essays. Readings will include *The Way of the World*, *Gulliver's Travels*, *Persuasion*, *A Room of One's Own*, *Arcadia*, and poetry by Pope, the major Romantics, Tennyson, Browning, Yeats, Hardy, and Auden.

ENGL 2030 Introduction to American Literatures (also AMST 2030) # (LA-AS)

Fall. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* L. Donaldson.

English 2030 introduces students to a wide range of North American literatures such as fiction, poetry, drama, political writing, autobiography, ethnography, sermons, songs, and storytelling. It covers the histories of these genres from before European colonization to the U.S. Civil War. The course begins with Native American creation stories and ends with Herman Melville. Students will interpret genres and authors within their specific literary and social contexts and engage with voices not commonly heard in American literary histories—Oludah Equiano and Nancy Ross, for example. Topics include European colonialism; slavery, race, and the making of North American literature; Native Americans—removal and resistance; women's literary production; the Enlightenment and revolution in North American colonies; and a special section on 18th-century natural histories.

ENGL 2040 Introduction to American Literatures: The Making of America: Reconstruction to the Present (also AMST 2040) (LA-AS)

Spring. 4 credits. J. Braddock.

This course will introduce students to American literature from the end of the Civil War to the present. We will consider a wide range of authors and literary movements while paying close attention to radical shifts in American life and culture in the past century and a half. We will ask: What traditions do American authors inherit and what new ones do they issue? How does this writing engage central issues of modern American culture such as race, immigration, globalization, and technology? The class will examine a variety of genres including poetry, novels, manifestos, autobiographies, legal tracts, and film. Authors include Cather, Dickinson, Ellison, Faulkner, L. Hughes, Hurston, Pynchon, N. West.

ENGL 2050 Contemporary World Literature @ (LA-AS)

Fall. 4 credits. E. Anker.

This course examines contemporary literature from the second half of the 20th century to the present. Our readings will range across genres (the novel, poetry, and drama) and include writers from multiple geographies—in addition to America and Britain, South Asia, Africa, the Middle East, and the Caribbean. As we seek to define the category of “world literature,” we will explore the innovations in aesthetics as well as the historical developments that have governed recent literary production. In turn, many of our readings will compel us to investigate how ethnicity, nationalism, religion, gender, sexuality, globalization, and other concerns have impacted the formation of world literature, especially in terms of its bearing on social justice. Authors may include: Salman Rushdie, Don DeLillo, Seamus Heaney, Sylvia Plath, J. M. Coetzee, Derek Walcott, Arundhati Roy.

ENGL 2060 The Great American Cornell Novel (also AMST 2060) (LA-AS)

Spring. 4 credits. M. Hite.

Some of the best novels of the last 50 years were written by people who were students or professors at Cornell. In this class we will read and discuss some of these novels—along with some shorter fiction—by some, but regrettably not all, of the following: Manette Ansary, Paul

Cody, Susan Choi, Richard Farina, Lamar Herrin, Alison Lurie, Dan McCall, Maureen McCoy, Lorrie Moore, Robert Morgan, J. Robert Lennon, Toni Morrison, Vladimir Nabokov, Stewart O'Nan, Thomas Pynchon, Stephanie Vaughn, Helena Maria Viramontes, and Kurt Vonnegut. Lecture—discussion format with sections, some guest appearances. Students will also be required to attend some readings outside of class periods.

[ENGL 2070 Introduction to Modern Poetry (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. R. Gilbert.]

ENGL 2080 Shakespeare and the 20th Century (LA-AS)

Spring. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* S. Davis.

What can we learn about Shakespeare's plays from their reception in the 20th and 21st centuries? What can we learn about modern cultures from their appropriations of these texts and of the Shakespeare mystique? We will study four or five plays and their adaptations in film and theater and explore the uses made of Shakespeare in education, advertising, and public culture and by the “Shakespeare industry” itself. For spring 2010: *Midsummer Night's Dream*, *Richard III*, *Othello*, *Lear*, and *Merchant of Venice*, together with films directed by Ismael Merchant and James Ivory, Richard Loncraine, Janet Suzman, Trevor Nunn, and Akira Kurosawa and plays by Bertolt Brecht, Wendy Wasserstein, and Arnold Wesker. See <http://courses.cit.cornell.edu/sad4449/2080>.

ENGL 2090 Introduction to Cultural Studies (CA-AS)

Fall. 4 credits. J. Juffer.

What is cultural studies? Although some would define the field loosely, this course argues for a fairly specific definition—one that emphasizes culture's material forms and the role of the critic in shaping access to cultural texts. We begin with the British Birmingham Centre in the 1960s and their study of subcultures. We then trace the movement of cultural studies across the Atlantic, examining how the field was taken up in the U.S. academy, especially in the realm of popular culture. Finally, we turn to the “globalization” of cultural studies, focusing on media flows and migration. Throughout, we will combine theory with its application to particular cultural objects, and students will design their own cultural studies projects.

Introductions to Literary Studies

ENGL 2130 Cultures of the Middle Ages # (CA-AS)

4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* S. Zacher.

This course introduces a wide range of literature written before 1500 and the cultures it was written in, especially in the region that became known as England. No previous knowledge of this material is required. We will read, in translation and with other help, a sample of works originally in Latin, Old English, Middle English, French, and Italian, beginning with the arrival of Christianity to England and ending with the splitting of the English church from Rome in the 16th century. Authors, works, and genres considered may include Bede, *Beowulf*, Old English prose and

poetry, saints' lives, histories (including Gildas and Geoffrey of Monmouth), women's writing, French and English romance, Boccaccio, Chaucer, and late-medieval drama. Requirements include regular informal writings and three formal, medium-sized papers.

ENGL 2270 Shakespeare (also THETR 2770) # (LA-AS)

Fall. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* B. Correll. An introduction to the dramatic works of Shakespeare, with a representative selection from the comedies, histories, and tragedies. We will study and discuss the formal and linguistic features of the plays; their historical, political, and cultural contexts; early modern theater history; issues of gender, class, and race as they inform and enliven the works; and questions of reading Shakespeare as an author, a field of study, and a cultural institution.

Major Genres and Areas

ENGL 2400 Introduction to Latino/a Literature (also AMST 2401, LSP 2400) (LA-AS)

Fall. 4 credits. M. P. Brady. From the radical manifestos of revolutionaries to the satirical plays of union organizers, from new, experimental novels to blogs, this course will examine Latino/a literature published in the United States beginning in the early 19th century and continuing to the present. We will pay particular attention to the historical, theoretical, and literary context for this literature. We will also study memoir, poetry, essays. Authors will include José Martí, Arturo Schomburg, Maria Cristina Mena, Bernardo Vega, Gloria Anzaldúa, Sandra Cisneros, Junot Díaz, Manuel Muñoz, and Pedro Pietri.

[ENGL 2510 20th-Century Women Writers (also AMST/FGSS 2510) (LA-AS)]

Fall. 4 credits. Next offered 2011–2012.]

[ENGL 2520 Late 20th-Century Women Writers and Visual Culture (also AMST 2520) (LA-AS)]

Spring. 4 credits. Limited to 15 students. Next offered 2011–2012. S. Samuels.]

[ENGL 2600 Introduction to American Indian Literatures in the United States (also AMST 2600) (LA-AS)]

Spring. 4 credits. Next offered 2012–2013. E. Cheyfitz.]

ENGL 2620 Asian American Literature (also AAS/AMST 2620) (LA-AS)

Spring. 4 credits. S. Wong. This course will introduce both a variety of writings by Asian North American authors and some critical issues concerning the production and reception of Asian American texts. Working primarily with novels, we will be asking questions about the relation between literary forms and the sociohistorical context within which they take on their meanings, and about the historical formation of Asian American identities.

ENGL 2650 Introduction to African American Literature (also AMST 2650) (CA-AS)

Fall. 4 credits. D. Woubshet. This course will introduce students to the African-American literary tradition. Through aesthetic and contextual approaches, we will consider how African-American life and culture has defined and constituted the United

States of America. From slave narratives to Hip-Hop music, we will trace the range of artistic conventions and cultural movements while paying close attention to broader historical shifts in American life over the past three centuries. We will ask: How do authors create and define a tradition? What are some of the recurring themes and motifs within this tradition? Authors will include: Phillis Wheatley, David Walker, Frederick Douglass, Ida B. Wells-Barnett, W.E.B. Du Bois, Zora Neal Hurston, Lorraine Hansberry, James Baldwin, Audre Lorde, Toni Morrison, and Paul Beatty.

[ENGL 2730 Children's Literature (LA-AS)]

Fall. 4 credits. Next offered 2011–2012. J. Adams.]

ENGL 2740 Scottish Literature # (LA-AS)

Fall. 4 credits; may be taken for 3 or 4 credits; those choosing 4 credits will complete an additional writing project. *This course may be used as one of the three pre-1800 courses required of English majors.* H. Shaw and T. Hill. Although Scotland, which was long a separate nation, is now politically united with England, it preserves its distinctiveness. This course provides an introduction to Scottish literature, with special emphasis on the medieval period and the 18th through the 20th centuries. The course should appeal to those who wish to learn about their Scottish heritage, and also those who simply wish to encounter a remarkable national culture and the literature it has produced. Some of the texts will be read in Scots, but no familiarity with Scots or earlier English is presumed. We welcome readers of literature who are not English majors.

[ENGL 2760 Desire (also COML/FGSS 2760, THETR 2780) (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. Letter grades only. E. Hanson.]

[ENGL 2770 Literatures of the Black Atlantic: Reading the Contemporary (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. D. Woubshet.]

Special Topics

ENGL 2100 Medieval Romance: Voyage to the Otherworld # (LA-AS)

Fall. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* T. Hill. The course will survey some medieval narratives concerned with representative voyages to the otherworld or with the impinging of the otherworld upon ordinary experience. The syllabus will normally include some representative Old Irish otherworld literature: selections from *The Mabinogion*; selections from the *Lays of Marie de France*; Chretien de Troye's *Erec, Yvain, and Lancelot*; and the Middle English *Sir Gawain and the Green Knight*. We will finish by looking at a few later otherworld romances, such as selections from J. R. R. Tolkien. All readings will be in modern English. Requirements: three brief (two to three typed pages) papers and a final exam designed to test the students' reading.

[ENGL 2150 The American Musical (also THETR 2150, AMST 2105, MUSIC 2250) (LA-AS)]

Fall. 4 credits. N. Salvato.]

ENGL 2170 History of the English Language (also LING 2217) # (HA-AS)

Fall. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* W. Harbert. For description, see LING 2170.

ENGL 2630 Studies in Film Analysis: Hitchcock (also FGSS 2630, FILM 2650) (LA-AS)

Fall. 4 credits. L. Bogel. Through detailed analysis of at least 15 of Hitchcock's major films—from British silents such as *Blackmail* and the British talkies of the '30s (*The Thirty-Nine Steps*) to the early '40s work in Hollywood (*Spellbound*, *Notorious*), and major American films of his late period (*Rear Window*, *Psycho*)—we will consider Hitchcock as a major technical and stylistic innovator in the history of cinema. As texts for psychoanalytic and feminist approaches to study, his films invite questions about film language, the ethics of spectatorship, and the nature of desire and sexuality. Frequent short essays and viewing exercises encourage students to engage through their writing the course's critical concerns. Regular required screenings after class. Enrollment limited to twenty. Preference given to Film and English majors.

[ENGL 2640 The Private I and the Public Eye: Exploring Latino/a Identity in Poetry, Fiction, and Nonfiction (CA-AS)]

Fall. 4 credits. Next offered 2010–2011. H. Viramontes.]

ENGL 2680 Culture and Politics of the 1960s (also AMST 2680) (CA-AS)

Fall. 4 credits. P. Sawyer. Nearly half a century ago, the civil rights movement, the Cold War and the Vietnam War stimulated critiques and alternative experiments in living that changed American society forever. What can the experiences of young "boomers" and others who lived through the 1960s teach a later generation living through a similar period of turmoil and hope? This interdisciplinary course combines an historical overview with the close reading of texts, concentrating on the topics of racial justice, war, the counterculture, the New Left, the women's movement, and the movement for gay and lesbian rights. Texts will include *The Autobiography of Malcolm X*, Wolfe's *Electric Kool-Aid Acid Test*, Vonnegut's *Slaughterhouse-5*, music of Dylan and Joplin, speeches of King, films, manifestos, memoirs, and poems. A research paper will explore the history of activism at Cornell during those years.

ENGL 2751 Literature, Sports, and Ideology (also ASRC 2505) (LA-AS)]

Fall. 3 credits. G. Farred. For description, see ASRC 2505.

ENGL 2920 Introduction to Visual Studies (also COML/VISST 2000) (LA-AS)]

Spring. 4 credits. I. Dadi. For description, see VISST 2000.

ENGL 2960 Linguistic Theory and Poetic Structure (also ENGL 5850, LING 2285/5585) (LA-AS)]

Spring. 4 credits. J. Bowers. For description, see LING 2285.

Courses for Sophomores, Juniors, and Seniors

Courses at the 3000 level are open to sophomores, juniors, and seniors and to others with the permission of the instructor.

[ENGL 3020 Literature and Theory (also ENGL 6020, COML 3020/6020) (LA-AS)]

Fall. 4 credits. Next offered 2010–2011. J. Culler.]

ENGL 3080 Icelandic Family Sagas # @ (LA-AS)

Spring. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* T. Hill.

An introduction to Old Norse–Icelandic mythology and the Icelandic family saga—the “native” heroic literary genre of Icelandic tradition. Texts will vary but will normally include the *Prose Edda*, the *Poetic Edda*, *Hrafnkels Saga*, *Njals Saga*, *Laxdaela Saga*, and *Grettirs Saga*. All readings will be in translation.

ENGL 3090 Autobiography: The Politics of History, Memory, and Identity (LA-AS)

Spring. 4 credits. J. Carlacio.

Autobiographical writing seeks to reveal a person’s life not only to him- or herself but also to his or her readers. Women and men used this genre both to interpret their experience for themselves and to politicize their lives for their readers. Constructed from memory and experience, life narratives complicate the seemingly transparent relationship between memory, history, and the “I” who recounts it. We will investigate this relationship and seek to understand how experience and memory shape each other and in turn shape the texts that “story” our lives. The class will read books and essays (by writers of various ethnicities) that investigate key moments in American autobiography since the 19th century. Work in this course will include several papers and work on the web.

ENGL 3110 Old English (also ENGL 6110) # (LA-AS)

Fall. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* S. Zacher.

The course is intended as an introduction for graduate and undergraduate students to the Old English language; graduate students may also opt to use it for somewhat more advanced work, if they wish. We will begin with simple prose texts and proceed to poetic texts such as *The Wanderer*; *The Seafarer*; *The Dream of the Rood*, and *The Wife’s Lament*. The course will address language and literature as a pairing. There will be regular translations and discussions, a mid-term, a short paper, and a final exam.

ENGL 3120 Beowulf (also ENGL 6120) # (LA-AS)

Spring. 4 credits. Required: one semester’s study of Old English or equivalent. *This course may be used as one of the three pre-1800 courses required of English majors.* T. Hill.

A close reading of *Beowulf*. Attention is given to relevant archaeological, literary, cultural, and linguistic issues.

[ENGL 3160 Medieval Beasts, Bodies, and Boundaries # (LA-AS)]

Fall. 4 credits. Next offered 2011–2012. S. Zacher.]

ENGL 3190 Chaucer # (LA-AS)

Spring. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.*

M. Raskolnikov.

Chaucer became known as the “father of English poetry” before he was entirely cold in his grave. Why is what he wrote more than six hundred years ago still riveting for us today? It’s not just because he is the granddaddy of this language and its literature; it’s because what he wrote was funny, fierce, thoughtful, political, philosophical, and, oh yes, notoriously bawdy. We’ll read some of Chaucer’s brilliant early work, and then dig into his two greatest achievements: the epic *Troilus and Criseyde*, and *The Canterbury Tales*, his oft-censored panorama of medieval English life. Chaucer will be read in Middle English, which will prove surprisingly easy and pleasant.

ENGL 3220 Studies in Renaissance Literature: English Renaissance Drama # (LA-AS)

Spring. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* Next offered 2011–2012. J. Mann.]

ENGL 3230 Renaissance Poetry # (LA-AS)

Spring. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* B. Correll.

Renaissance writers were acutely aware that poetry had the capacity to arouse emotion and sensation in the reader; this was precisely what made poetry such a marvelous instrument and such a serious threat. This course will focus on the relation of poetry to sense perception and sensualism in 16th- and 17th-century lyric. To what extent should poetry be a visual, aural, or tactile pleasure? Are there other means, apart from sense experience, by which poetry can stir the mind or the soul? We’ll begin with Golding’s translation of Ovid’s *Metamorphoses* in order to consider its influence on late 16th-century narrative verse and Ovidian lyric. Other readings will include works by Spenser, Marlowe, Shakespeare, Donne, Sidney (Philip and Mary), Whitney, Chapman, Lanier, Herrick, Herbert, Milton, and Marvell.

ENGL 3260 Spenser # (LA-AS)

Spring. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* B. Correll.

Edmund Spenser stands out among Renaissance writers, not just as the author of *The Faerie Queene*, but also as one who set out to find literary fame as English nation poet by modeling his career after Virgil and other predecessors. While reading Spenser’s shorter poetic works, some prose, and, of course, his intriguing epic, we will follow Spenser’s development and engage with issues of genre, cultural and religious politics, colonialism, and questions of allegory, and early modern authorship.

ENGL 3270 Shakespeare # (LA-AS)

Spring. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* P. Lorenz.

A lecture and discussion course on Shakespeare’s plays from the middle to late part of his career: “dark comedies,” late tragedies, and romances. While we will pay particular attention to questions of dramatic form and historical context, the main focus of the course is on careful close readings of the play-texts themselves. Plays include *Hamlet*, *Measure for Measure*, *Othello*, *King Lear*, *Macbeth*, *Antony and Cleopatra*, *The Winter’s Tale*, and *The Tempest*.

[ENGL 3280 The Bible as Literature # (LA-AS)]

Fall. 4 credits. Next offered 2010–2011. L. Donaldson.]

ENGL 3290 Milton and the English Revolution (also HIST 3051) # (LA-AS)

Fall. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* R. Kalas and R. Weil.

This course places Milton in the context of the intellectual and political upheavals of the mid-17th century English Revolution, foregrounding his engagement with debates on religion, freedom and regicide as well as his experience of revolution and reaction. Readings include selected short poems, *Comus*, *Samson Agonistes*, *Paradise Regained*, *Paradise Lost*, *Areopagitica*, *The Doctrine and Discipline of Divorce*, *Eikonoklastes*, and other polemical works.

ENGL 3300 Restoration and 18th-Century Literature # (LA-AS)

Fall. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* F. Bogel.

Close reading of texts in a variety of genres (poetry, fiction, drama, autobiography) will be guided by such topics as: the nature of satire, irony, and mock-forms; the languages of the ridiculous and the sublime; the politics of gender and sexuality; the authority and fallibility of human knowledge; connections among melancholy, madness, and imagination. Works by such writers as Rochester, Behn, Finch, Dryden, Swift, Gay, Defoe, Johnson, Boswell, Sterne, and Cowper.

ENGL 3330 The 18th-Century English Novel # (LA-AS)

Spring. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* N. Saccamano.

A study of form and theme in the British novel tradition. The course focuses on representative novels mostly from the 18th century, paying close attention to language and structure but also to cultural contexts and to the development of the novel form itself. We will explore such topics as truth and fiction; romance, realism, satire, and the gothic; heroic and mock-heroic modes; sentiment, sensibility, and sexuality; race and gender; and the forms and uses of narrative. Readings may include Behn’s *Oroonoko*, Defoe’s *Moll Flanders*, Richardson’s *Clarissa*, Fielding’s *Tom Jones*, Johnson’s *Rasselas*, Sterne’s *A Sentimental Journey*, and Austen’s *Emma*.

[ENGL 3350 Modern Western Drama, Modern Western Theater: Theory and Practice (also THETR 3350/VISST 3735) (LA-AS)]

Fall. 4 credits. Next offered 2010–2011. N. Salvato.]

ENGL 3390 Austen and Others # (LA-AS)

Fall. 4 credits. H. Shaw.

Our main business (and pleasure) will be to read and discuss nearly all of Austen's fiction. As for the Others in the course title, they will be a miscellaneous bunch—novelists who preceded and followed her, critics recent and not so recent, 18th-century consultant on good breeding, experts on landscape gardening and country houses, a couple of filmmakers. Why do we read Austen? Why should we? How do her novels work to delight? What makes her singular? Is she our contemporary, or her own? These are some of the questions that will engage us.

[ENGL 3400 Studies in Romantic Literature: The English Romantic Period # (LA-AS)]

Fall. 4 credits. Next offered 2011–2012.]

ENGL 3450 The Victorians # (LA-AS)

Spring. 4 credits. J. Zigarovich.

A century after the death of Queen Victoria, the culture that bears her name is alive and well in contemporary society, from critical and political discourse to the popular media and consumer culture. An introduction to British literature of the Victorian Age (1837–1901), this course investigates the uses of Victorian culture in the following areas: Industrialism; the construction of social and anthropological ideas of culture; Nature and the Human Animal; Wealth and Class; Education; Childhood; Feminism; Sexuality and Desire; Death and Mourning; Imperialism; and Satire and Popular Entertainment in mass culture. Poetry and non-fiction prose of Tennyson, Browning, Arnold, Carlyle, Pater, Mill, and others, emphasizing literary, social, and political issues, and religious controversies, will be covered, in addition to the drama and criticism of Oscar Wilde and possibly the prose work of Charlotte Brontë, Charles Dickens, and Thomas Hardy.

[ENGL 3480 Studies in Women's Literature: Feminist Literary Traditions (also AMST 3481, FGSS 3480) (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. K. McCullough.]

ENGL 3490 Shakespeare and Europe (also COML 3480) # (LA-AS)Fall. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* W. Kennedy.

For description, see COML 3480.

ENGL 3500 The Modern Tradition (LA-AS)

Spring. 4 credits. D. Schwarz.

Critical study of major works by Hardy, Conrad, Lawrence, Joyce, Woolf, Eliot, Yeats, Hopkins, Wilde, Wallace Stevens, and others. While the emphasis will be on close reading of individual texts, we shall place the authors and works within the context of literary, political, cultural, and intellectual history. The course will seek to define the development of literary modernism (mostly but not exclusively in England), and relate literary modernism in England to that in Europe and America as well as to other intellectual developments. We shall be especially interested in the relationship between modern literature and modern painting and sculpture; on occasion, we shall look at slides. Within the course material, students will be able to select the topics on which they write essays.

ENGL 3510 Caribbean Literature: Migrating Subjects (also ASRC/FGSS 3510) (LA-AS)

Fall. 4 credits. C. Boyce Davies. For description, see ASRC 3510.

ENGL 3530 The Modern Indian Novel @ (LA-AS)

Spring. 4 credits. S. Mohanty.

A survey of the modern Indian novel, from its origins in the latter part of the 19th century to the present. An attempt will be made to read the novels as responses to colonialism and to the challenges of a postcolonial society. Texts (mainly novels, but also a few short stories) drawn from a variety of Indian languages as well as English, including works by such authors as U. R. Ananthamurthy, Rabindranath Tagore, Salman Rushdie, Gopinath Mohanty, Anita Desai, Fakir Mohan Senapati, Ambai, Prem Chand, Arundhati Roy, and R. K. Narayan. Two papers (5–6 pp. and 12–14 pp.) and a journal.

[ENGL 3540 The British Modernist Novel (LA-AS)]

Fall. 4 credits. Next offered 2010–2011.]

ENGL 3550 Decadence (also COML/FGSS 3550/6551, ENGL 6551) (LA-AS)

Spring. 4 credits. E. Hanson.

"My existence is a scandal," Oscar Wilde once wrote, summing up in an epigram the effect of his carefully cultivated style of perversity and paradox. Through their valorization of aestheticism and all that was considered artificial, unnatural, or perverse, the so-called "Decadent" writers of the late 19th century sought to free the pleasures of beauty, spirituality, and sexual desire from their more conventional ethical moorings. We will discuss literary and visual texts by Charles Baudelaire, Edgar Allan Poe, J.-K. Huysmans, Leopold von Sacher-Masoch, A. C. Swinburne, Walter Pater, René Vivien, James McNeill Whistler, and Aubrey Beardsley, with a particular focus on Oscar Wilde. Students may read French and German texts in the original or in English translation.

ENGL 3570 The Gothic # (HA-AS)

Spring. 4 credits. J. Zigarovich.

For this course, we will trace the evolution of the fantastic and haunting from the origins of the movement. We will examine the early sources of the Gothic then trace the development of the supernatural and macabre in the 19th century. What are the psychological effects of the representation of fear, irrationality, and social conflict? How can we understand Gothic monsters as social Others? What elements create terror, the sublime, and the uncanny? The course will cover philosophical and critical approaches to the genre as we learn about the cultural impact of the Gothic. Texts covered may include Edgar Allan Poe's short stories, Mary Shelley's *Frankenstein*, Robert Louis Stevenson's *Strange Case of Dr. Jekyll and Mr. Hyde*, and Bram Stoker's *Dracula*.

ENGL 3571 The Modern Irish Writers (CA-AS)

Fall. 4 credits. K. Attell.

This is a course on Irish writing of the modern period. In our readings over the semester (which will include a number of the 20th century's major literary texts), we will cover the development of Irish writing from the Yeats-led Irish Revival of century's early years through Joyce's high modernist masterpiece to the proto-postmodernisms of O'Brien and Beckett. Along the way we will also inquire into the

ways in which Irish modernism raises fundamental questions about such things as: the relation between language and national identity; the nature of modernism's "newness"; colonial, postcolonial, and "semicolonial" culture; the political uses of literature; and the contending forces of cosmopolitanism and nationalism in the modern period.

ENGL 3590 Consuming Passions: Media, Space, and the Body (also FGSS 3590) (CA-AS)

Spring. 3 credits. J. Juffer. For description, see FGSS 3590.

[ENGL 3600 Another World Is Possible: The American Left Since the 1960s (also AMST 3600) (LA-AS)]

Fall. 4 credits. Next offered 2010–2011. P. Sawyer.]

[ENGL 3610 Studies in the Formation of U.S. Literature: Emerson to Melville (also AMST 3610) # (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. D. Fried.]

[ENGL 3620 Studies in U.S. Literature after 1850: Reconstructing America (also AMST 3640) (LA-AS)]

Fall. 4 credits. Next offered 2010–2011.]

[ENGL 3630 Studies in U.S. Literature: The Age of Realism and Naturalism (also AMST/FGSS 3630) (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. K. McCullough.]

ENGL 3640 Studies in U.S. Literature After 1950: American Literature, the 1980s (also AMST 3640) (LA-AS)

Spring. 4 credits. D. Woubshet.

This course will explore literature of the 1980s against the broader cultural and historical landscape of 80s America. In many ways, we live in the immediate shadow of the 1980s, but our slight remove from the decade affords us a chance to look back at the literature and culture of the 80s with some distance (and familiarity). In this course, we will give particular emphasis to the following themes: postmodernism, the blurring of literary genres, the blurring of taste (high vs. low culture), the emphasis on (racial, gender, and sexual) difference, pop culture, and history. Authors may include: Don DeLillo, Kurt Vonnegut, Maxine Hong Kingston, Thomas Pynchon, Toni Morrison, Norman Mailer, Ishmael Reed, Audre Lorde, and Gloria Anzaldúa.

[ENGL 3650 American Literature Since 1945 (also AMST 3650) (LA-AS)]

Fall. 4 credits. Next offered 2010–2011. B. Maxwell.]

[ENGL 3660 Studies in U.S. Fiction Before 1900: The 19th-Century American Novel (also AMST 3660) # (LA-AS)]

Spring. 4 credits. Next offered 2010–2011.]

ENGL 3670 Studies in U.S. Fiction: Novels and Short Stories in the Americas (also AMST 3670) (LA-AS)

Fall. 4 credits. M. P. Brady.

This course will consider well-known and obscure fiction by writers ranging across the Americas. We will examine major themes and issues as well as consider various aesthetic trends. Writers to be studied may include Nathaniel Hawthorne, Pauline Hopkins, William Dean Howells, Mariano Azuela, Willa Cather, Thomas Pynchon, Toni Morrison, Flannery O'Connor, Joy Kogawa, Henry James, Edith Wharton, and more.

[ENGL 3680 Faulkner (LA-AS)]

4 credits. Next offered 2010–2011.]

[ENGL 3690 Fast-Talking Dames and Sad Ladies: 1940s and Now (also FILM/FGSS 3690) (LA-AS)]

Spring. 4 credits. Limited to 15 students. Students must be able to attend Mon. and/or Tues. late-afternoon screenings. Film fee: \$20. L. Bogel.

Focusing on sassy or subdued heroines of Hollywood's 1940s films and current films, this seminar works to define romantic comedy and melodrama as genres; as vehicles for female stars; as ways of viewing the world. Psychoanalytic and feminist analyses of these films will help us pose questions about gender and culture, about gendered spectatorship, about Hollywood's changing constructions of "woman," the "maternal," and the "feminine," and about representations of desire, pleasure, fantasy, and ideology. Required twice-weekly screenings of such films as *Gilda*, *The Lady Eve*, *Notorious*, *The Women*, *The Philadelphia Story*, *His Girl Friday*, *Mrs. Dalloway*, *The Hours*, *First Wives' Club*, *All About My Mother*, *Silence of the Lambs*, and *Far from Heaven*.

[ENGL 3700 The Victorian Novel # (LA-AS)]

Fall. 4 credits. P. Sawyer.

In the 19th century, British novelists produced some of the most complex representations of human society and historical change in fiction. They also drew upon a variety of narrative techniques: free indirect discourse, multiplot narrative, symbolic structure, multiple narrators, and "found" documents. In addition to introducing students to specific texts and authors, this course will concern ways of reading fiction in general. Topics will include representations of community and class, the modern city, the supernatural, and the construction of male and female identity. Likely readings: Austen, *Emma*; Scott, "The Two Drovers"; Emily Bronte, *Wuthering Heights*; Dickens, *Little Dorrit*; Eliot, *Middlemarch*; and Hardy, *Tess of the d'Urbervilles*.

[ENGL 3702 Desire and Cinema (also COML/FGSS 3702) (LA-AS)]

Spring. 4 credits. Letter grades only. Next offered 2011–2012. E. Hanson.]

[ENGL 3711 American Poetry to 1950 (also AMST 3711) (LA-AS)]

Fall. 4 credits. R. Gilbert.

In this course we'll trace the main lines of development that have shaped American poetry from its inception in the 17th century, through the radical originality of Walt Whitman and Emily Dickinson, down to the bold innovations of early 20th-century poets. In addition to Whitman and Dickinson, poets to be studied will include Anne Bradstreet, Ralph Waldo Emerson, Edgar Allan Poe, Robert Frost, Ezra Pound, T. S. Eliot, H. D., Wallace Stevens, William Carlos Williams, Marianne Moore, Langston Hughes, and Hart Crane. Weekly informal reading responses; three essays.

[ENGL 3712 American Poetry Since 1950 (also AMST 3712) (LA-AS)]

Spring. 4 credits. R. Gilbert.

The second half of the 20th century has been a remarkably diverse period in American poetry, characterized by restless exploration of new areas of language and experience. In this course we'll focus on a series of representative

figures born between 1900 and 1950. These may include some or all of the following: Theodore Roethke, Elizabeth Bishop, Gwendolyn Brooks, John Berryman, Robert Lowell, Robert Creeley, Allen Ginsberg, Frank O'Hara, W. S. Merwin, James Wright, A. R. Ammons, John Ashbery, James Merrill, Sylvia Plath, and Adrienne Rich. Weekly informal reading responses; three essays.

[ENGL 3720 Medieval and Renaissance Drama (also THETR 3720) # (LA-AS)]Spring. 4 credits. *This course may be used as one of the three courses pre-1800 required of English majors.* Next offered 2010–2011. M. Raskolnikov.]**[ENGL 3721 Food, Gender, Culture (also AMST/FGSS 3720)]**

Fall. 4 credits. K. McCullough. For description, see FGSS 3720.

[ENGL 3730 Weird Science, Hard Poems (LA-AS)]

Fall. 4 credits. Next offered 2010–2011. L. Van Clief-Stefanon.]

[ENGL 3731 Reading for Writers: Weird Stories (LA-AS)]

Fall. 4 credits. J. R. Lennon.

This course will focus on short fiction that departs from representational reality, studied from a writerly point of view. We'll examine excursions from the conventions of plot, character, narrative structure, and grammar. What opportunities have these departures afforded fiction writers? Do they wish to imply that conventional narrative has lost its luster, or do they merely serve to broaden its boundaries? Included will be works by Chekhov, Nabokov, Dybek, Dixon, Link, Lethem, Davis, Murakami, Saunders, Mieville, Whitehead, and others. Grade will come from in-class presentations and discussion, and from a portfolio of experimental writing assignments. The course is open to all undergraduates, though I recommend taking ENGL 2800 first. Poets welcome.

[ENGL 3732 Reading for Writers: Reading as Poets (LA-AS)]

Spring. 4 credits. A. Fulton.

In this class, students will learn to use contemporary poetry books as catalysts for their own poetry. We'll read a volume of contemporary poems each week with an eye toward issues of content and craft. We also might read a few essays on poetics. Rather than respond to the reading with papers, students will respond with poems directly influenced by or in conversation with the assigned books, and with brief explanations of the ways in which their poems encounter a given text. In class, we'll consider each book's focus, structure, and techniques. Discussions will help us understand and appreciate divergent aesthetics. In essence, the course recognizes the reading of contemporary poetry as the most essential element of a poet's education. Please note: This is not a poetry workshop. Classroom discussion will focus on the assigned books.

[ENGL 3740 Studies in African American Literature: 1940–present (LA-AS)]

Fall. 4 credits. Next offered 2010–2011.]

[ENGL 3750 Studies in Drama and Theatre: 20th-Century Drama: Theatres of Selfhood (also THETR 3750) (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. P. Lorenz.]

[ENGL 3751 Magical Realism Revisited (CA-AS)]

Spring. 4 credits. E. Quinonez.

Magical Realism was the term used to power the "boom period," when Latin American writers were being popularly translated into English during the '60s and '70s. We'll examine the term as both a genre and as anti-imperialist, coded, writings of protest. We'll inspect what magical realism means in today's world and also examine its "cousins": fantasy, science fiction, horror, myth, folklore, and anything in between. We'll screen movies, hear songs, see slides of paintings from Latin America. The bulk of the texts will be "boom writers" García Marquez, Vargas Llosa, Rosario Castellanos, Jorge Amado, Luisa Valenzuela, Juan Rulfo, Jose Donoso, Clarice Lispector as well as texts by Amy Bender, Paul Auster, Salman Rushdie, Toni Morrison, and others who have been influenced by magical realism.

[ENGL 3770 Herman Melville (also AMST 3770) # (HA-AS)]

Fall. 4 credits. M. Cobb.

Who doesn't long for an adventure? Who'd refuse the chance to learn about the meaning of life? Who hasn't spent years of a life chasing a big, white fish? Melville, for sure, takes us on a great aesthetic voyage through some of American literature's major obsessions. And now you're invited aboard. The bulk of the class will be on the sea, hunting that whale in one of the world's most acclaimed novels, *Moby Dick*, but we'll also plunge into *Billy Budd*, *Sailor*, and *The Piazza Tales* (especially "Benito Cereno," "The Encantadas," and "Bartleby, The Scrivener"). We'll also read some select works from writers that resonate with Melville's (and our) imagination, especially Milton, Shakespeare, and Hawthorne. And we'll pay particular attention to things that always preoccupy Melville's readers: nationality, politics, identity, religion, history, class, race, gender, sexuality, formal experimentation, Romanticism, the economy, realism, allegory, and the Gothic, among others.

[ENGL 3790 Reading Nabokov (also RUSSL 3385) (LA-AS)]**[ENGL 3800 Time Sensitive: Poets of the Last 10 Minutes (LA-AS)]**

Fall. 4 credits. Next offered 2011–2012. A. Fulton.]

[ENGL 3810 Reading as Writing (LA-AS)]

See complete course description in section headed "Critical Writing and Literary Nonfiction."

[ENGL 3820–3830 Narrative Writing (LA-AS)]

See complete course description in section headed "Creative Writing."

[ENGL 3840–3850 Verse Writing (LA-AS)]

See complete course description in section headed "Creative Writing."

[ENGL 3860 Philosophic Fictions (LA-AS)]

See complete course description in section headed "Critical Writing and Literary Nonfiction."

[ENGL 3870 Autobiography: Theory and Practice (LA-AS)]

See complete course description in section headed "Critical Writing and Literary Nonfiction."

ENGL 3880 The Art of the Essay (LA-AS)

See complete course description in section headed "Critical Writing and Literary Nonfiction."

[ENGL 3970 Policing and Prisons in American Culture (also AMST 3970) (CA-AS)]

Spring. 4 credits. Next offered 2010-2011. B. Maxwell.]

[ENGL 3980 Latino/a Popular Culture (also AMST 3981, LSP 3980) (CA-AS)]

Spring. 4 credits. U.S. Latino/a history is strongly recommended as a prerequisite, but not required. Next offered 2011-2012. M. P. Brady.]

Courses for Advanced Undergraduates

Courses at the 4000 level are open to juniors and seniors and to others by permission of instructor unless other prerequisites are noted.

[ENGL 4020 Literature as Moral Inquiry (KCM-AS)]

Fall. 4 credits. Next offered 2011-2012. S. Mohanty.]

ENGL 4030 Studies in American Poetry: A. R. Ammons, John Ashbery, and Adrienne Rich (LA-AS)

Fall. 4 credits. R. Gilbert.

A close study of three major contemporary American poets who have had unusually long and varied careers. We will survey each poet's work from his/her earliest books to the most recent, paying close attention to individual poems while charting significant shifts of style and content. We'll also consider each poet's engagement with extra-literary realms: science (Ammons), visual art (Ashbery), gender politics (Rich). Three essays; one or two in-class presentations.

[ENGL 4040 Paleography, Bibliography, and Reception History (also ENGL 6040) # (LA-AS)]

Spring. 4 credits. Next offered 2010-2011. A. Galloway.]

ENGL 4050 The Politics of Contemporary Criticism (LA-AS)

Spring. 4 credits. S. Mohanty.

An introduction to some of the major issues in contemporary criticism and theory, with primary focus on such questions as: What is a (literary or cultural) text? What is interpretation and can it ever be objective? How do cultural and social differences shape reading and interpretation? What views about knowledge, society, and politics underlie particular critical strategies and methodological choices? Drawing on representative essays and books from a variety of critical schools and traditions (from New Criticism to deconstruction, Marxism, hermeneutics, new historicism, and feminism), we will examine the competing claims of the various positions and focus on the implications of answers to the above questions for textual analysis. Readings from Cleanth Brooks, Jacques Derrida, Michel Foucault, Hans-Georg Gadamer, Sandra Harding, Fredric Jameson, Toni Morrison, Barbara Herrnstein Smith, Charles Taylor, and Richard Rorty, among others.

ENGL 4072 Medieval Translation in Motion (also FREN/SHUM 4824)

Fall. 4 credits. S. Chaganti.
For description, see SHUM 4824.

ENGL 4073 Abolitionist Circuits (also HIST/SHUM 4933)

Spring. 4 credits. M. Schoolman.
For description, see SHUM 4933.

ENGL 4074 Art Writing: Tracing the Visible (also ARTH/VISST/SHUM 4934)

Spring. 4 credits. M. Jacobus.
For description, see SHUM 4934.

[ENGL 4100 The Roots of Buffy the Vampire Slayer: Folklore and Medieval Romance]

Spring. 4 credits. Prerequisites: there are no requirements as such but students should have some background in medieval literature and a reading knowledge of French and Middle English would be useful. *This course may be used as one of the three pre-1800 courses required of English majors.* Next offered 2010-2011. T. Hill.]

[ENGL 4130 Middle English (also ENGL 6130) # (LA-AS)]

Fall. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* Next offered 2010-2011. T. Hill.]

[ENGL 4140 Bodies of the Middle Ages: Embodiment, Incarnation, Performance (also FGSS 4140) # (LA-AS)]

Spring. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* Next offered 2010-2011. M. Raskolnikov.]

ENGL 4170 The Archaeology of the Text from Chaucer through the Renaissance (also ENGL 6170) # (HA-AS)]

Fall. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* A. Galloway.

[ENGL 4190 The Old English Laws and Their Politico-Cultural Context (also ENGL 6090, HIST 4691/6691) # (CA-AS)]

Fall. 4 credits. Next offered 2011-2012. P. Hyams and T. Hill.]

[ENGL 4210 Shakespeare in (Con)Text (also THETR 4460, VISST 4546) # (LA-AS)]**[ENGL 4211 Advanced Seminar in the Renaissance: Literature, Science, and Renaissance Curiosities # (LA-AS)]**

Fall. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* Next offered 2011-2012. J. Mann.]

[ENGL 4220 Renaissance "Traffick" # (LA-AS)]

Spring. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* Next offered 2010-2011. R. Kalas.]

[ENGL 4230 Renaissance Lyric # (LA-AS)]

Spring. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* Next offered 2011-2012. B. Correll.]

ENGL 4270 Advanced Seminar in Shakespeare: Shakespeare and Marlowe (also THETR 4270) # (LA-AS)]

Fall. 4 credits. B. Correll.

This course brings together two of the most striking and powerful writers of the early modern period. Their work in drama and in verse, often innovative and path-breaking, provokes questions and thoughts not only about their historical relationship but also about issues of power (including the cultural authority of classical heritage), gender/sexuality, nation and empire. Texts will include *The Jew of Malta*, *The Merchant of Venice*, *Dido Queen of Carthage*, *Antony and Cleopatra*, *Tamburlaine I and II*, *Richard III*, *Edward II*, *Richard II*, *Hero and Leander*, *Venus and Adonis*, and some classical source material. There are no prerequisites for the course other than an adventurous mind and an appetite for work.

[ENGL 4280 Problem Poems: Close Reading and Critical Debate # (LA-AS)]

Spring. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* Next offered 2010-2011. F. Bogel.]

[ENGL 4290 Adam's Rib and Other Divine Signs (also RELST 4290) # (LA-AS)]

Spring. 4 credits. Next offered 2011-2012. L. Donaldson.]

ENGL 4300 Romantic Beginnings

Spring. 4 credits. C. Caruth.

This course presents a study of major Romantic writers with a focus on the nature of literary, political and historical beginnings. We will examine the portrayal of revolution as an ordinary historical and political event and consider its relation to poetic origination. Among our interests will be the role of language as the Romantic writers conceived it in both the literary and political spheres and the struggle with literary form as the site of radical beginning. We will also consider memory in the constitution of the past (and future) and the complex relation between remembering and creating. Themes include the child and orphan and the encounter with death, revolution and freedom (in Wordsworth, Coleridge, the Shelleys, Keats; political, literary theory; Douglass, Hawthorne, Melville).

ENGL 4301 Rabinor Seminar: Queering Latinidad (also AMST 4301)

Spring. 4 credits. M. P. Brady.

For description, see AMST 4301.

ENGL 4303 Literature as History: The Americas (also AMST/COML 4303)

Fall. 4 credits. B. Maxwell.

For description, see AMST 4303.

[ENGL 4310 Defoe and His Contemporaries # (HA-AS)]

Spring. 4 credits. Next offered 2011-2012. N. Saccamano.]

[ENGL 4321 Telling Fictions (also COML 4321)]

Spring. 4 credits. Next offered 2011-2012. C. Chase.]

[ENGL 4440 Romantic Drama (also ENGL 6440, THETR 4400/6440) (LA-AS)]

Fall. 4 credits. Next offered 2011-2012. R. Parker.]

ENGL 4450 Text Analysis for Production: How to Get from the Text onto the Stage (also THETR 4450)

Spring. 4 credits. B. Levitt.

For description, see THETR 4450.

[ENGL 4500 History of the Book # (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. K. Reagan.]

ENGL 4508 The Harlem Renaissance (also ASRC 4508) (LA-AS)

Fall. 4 credits. R. Richardson
For description, see ASRC 4508.

ENGL 4509 Toni Morrison's Novels (also ASRC 4509/6513)

Spring. 4 credits. R. Richardson.
For description, see ASRC 4509.

ENGL 4515 Ariosto, Rabelais, Spenser (also ENGL 6515, COML/ROMS 4515/6515) (CA-AS)

Fall. 4 credits. W. Kennedy.
For description, see COML 4515.

ENGL 4530 20th-Century Women Writers of Color (also AAS/FGSS 4530) (LA-AS)

Fall. 4 credits. S. Wong.
In this course, we'll be reading literature—primarily novels—produced by hemispheric American women writers of the mid- to late 20th century. We will look at how these writings articulate concerns with language, home, mobility, and memory, and at how the work is informed by the specificities of gender, race, region and class. Readings may include work by Leslie Marmon Silko, Sandra Cisneros, Theresa Hak Kyung Cha, Jamaica Kincaid, Gwendolyn Brooks, Ann Petry, Fae Myenne Ng, Carolivia Herron, Helena Maria Viramontes, and Shani Mootoo. Course requirements will include class presentations, short responses to the readings, and a longer research essay.

[ENGL 4560 Constructing the Book, Reconstructing the Text (also ENGL 6500) # (LA-AS)]

Fall. 4 credits. *This course may be used as one of the three pre-1800 courses required of English majors.* Next offered 2011–2012. C. Ruff.]

ENGL 4580 Imagining the Holocaust (also COML 4830, GERST 4570, JWST 4580) (LA-AS)

Spring. 4 credits. D. Schwarz.
What is the role of the literary imagination in keeping the memory of the Holocaust alive for our culture? We shall examine major and widely read Holocaust narratives that have shaped the way we understand and respond to the Holocaust. We shall begin with first person reminiscences—Wiesel's *Night*, Levi's *Survival at Auschwitz*, and *The Diary of Anne Frank*—before turning to realistic fictions such as Kineally's *Schindler's List* (and Spielberg's film), Kertesz's *Fateless*, Kosinski's *The Painted Bird*, and Ozick's "The Shawl." We shall also read the mythopoeic vision of Schwarz-Bart's *The Last of the Just*, the illuminating distortions of Epstein's *King of the Jews*, the Kafkaesque parable of Appelfeld's *Badenheim 1939*, and the fantastic cartoons of Spiegelman's *Maus* books.

[ENGL 4600 Melville (also AMST 4600) # (LA-AS)]

Fall. 4 credits. Next offered 2011–2012. B. Maxwell.]

[ENGL 4601 Riddles of Rhythm (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. D. Fried.]

[ENGL 4610 The American Short Story: Where We've Been, Where We're Going]

Spring. 4 credits. Next offered 2011–2012. S. Vaughn.]

[ENGL 4620 Advanced Seminar in Latina/o Studies: Chicana Feminisms in a Globalizing World (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. M. Brady.]

[ENGL 4650 American Violence (LA-AS)]

Fall. 4 credits. Next offered 2012–2013. S. Samuels.]

[ENGL 4660 James on Film (also THETR 4660) (LA-AS)]

Fall. 4 credits. Next offered 2011–2012. D. Fried.]

ENGL 4662 Contemporary U.S. American Indian Poetry (also AMST 4662)

Fall. 4 credits. Next offered 2011–2012. E. Cheyfitz.]

[ENGL 4690 The Paranoid Style in Contemporary American Fiction and Film (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. K. Attell.]

[ENGL 4700 Senior Seminar in the Novel: Reading Joyce's *Ulysses* (LA-AS)]

Fall. 4 credits. Next offered 2011–2012. D. Schwarz.]

[ENGL 4701 Documentary Recording, Writing, and Film (LA-AS)]

Fall. 4 credits. Next offered 2011–2012. J. Braddock.]

ENGL 4710 Transatlantic Nature: Writing Natural History in 18th- and 19th-Century Literature

Fall. 4 credits. L. Donaldson.

Transatlantic Nature is an interdisciplinary seminar that focuses on the literary and historical contexts of natural history writing in the 18th and early 19th centuries. Natural history is an important genre because it raises crucial questions about humanity's relationship to the natural world, the ethical implications of science, and the immersion of intellectual life in colonial history. It also occasioned some of the most exquisite art in the 18th and 19th centuries and anticipated many of the ecological insights of the modern world. This course will focus on the intersection of these dimensions as well as the intersection of natural history's geographical origins in both Europe and North America. Possible authors include William Bartram, Marc Catesby, Gilbert White, Maria Sybilla Merian, and John James Audubon.

[ENGL 4725 Advanced Seminar in Postcolonial Literatures: Nation, Exile, and Migration in Postcolonial Literatures (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. E. Anker.]

[ENGL 4740 Advanced Seminar on Major Authors: Hemingway, Fitzgerald, and Faulkner (LA-AS)]

Spring. 4 credits. Next offered 2010–2011.]

ENGL 4750 Advanced Seminar in the 20th Century: AIDS Literature (also AMST 4755, FGSS 4751)

Spring. 4 credits. D. Woubshet.
AIDS is one of the hallmarks of our contemporary world, and the loss endured due to this pandemic has been of epic

proportions. In this seminar, we will consider literary and other responses to this cataclysmic event. We will give particular attention to the following questions: How do artists rely on, dilate, or overhaul antecedent conventions to express AIDS loss? What are the insights and limitations of particular stylistic and formal choices? How do artists balance consolation in the face of compounded crises? How are their creative responses shaping our interpretation of the history and memory of AIDS? Authors may include: Melvin Dixon, Tony Kushner, Paul Monette, Jamaica Kincaid, Susan Sontag, Essex Hemphill, Marlon Riggs, Larry Kramer, Thomas Glave, and Michael Cunningham.

[ENGL 4780 Intersections in Lesbian Fiction (also AMST 4780, FGSS 4770) (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. K. McCullough.]

[ENGL 4790 Advanced Seminar in American Literature: Visual Culture and Women's Literature (also AMST/FGSS 4790, VISST 4800) (LA-AS)]

Fall. 4 credits. Next offered 2012–2013. S. Samuels.]

[ENGL 4791 Transgender and Transexuality (also FGSS 4791) (LA-AS)]

Fall. 4 credits. Next offered 2011–2012. M. Raskolnikov.]

ENGL 4800–4810 Seminar in Writing (LA-AS)

4800; fall; 4810, spring. 4 credits.

For description, see section "Creative Writing."

ENGL 4820 Hamlet: The Seminar (also THETR 4470) # (LA-AS)]

Fall. 4 credits. B. Levitt.

For description, see THETR 4470.

[ENGL 4840 Postcolonial Poetry and the Poetics of Relation (also COML 4290/6350, FREN 4350/6850, SPAN 4350/6350) (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. J. Monroe.]

[ENGL 4860 American Indian Women's Literature (also AIS 4860) (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. L. Donaldson.]

ENGL 4880 Contemporary Poetry and Poetics (also COML 4860) (LA-AS)]

Fall. 4 credits. J. Monroe.

For description, see COML 4860.

ENGL 4910 Honors Seminar I

Fall. 4 credits. Open to students in the Honors Program in English or related fields, or by permission of instructor.

Sem 1: Reading Joyce's *Ulysses*

D. Schwarz. A thorough episode-by-episode study of the art and meaning of Joyce's *Ulysses*. We shall place *Ulysses* in the context of Joyce's canon, Irish culture, and literary modernism. We shall explore the relationship between *Ulysses* and other experiments in modernism—especially painting and sculpture—and show how *Ulysses* redefines the concepts of epic, hero, and reader. We shall discuss how *Ulysses* raises major issues about the city, colonialism, and popular culture, and dramatizes what it means for the central character to be a Jew and an outsider in Dublin. We shall also discuss strategies of reading and approaches to literary study. No previous experience with Joyce is required.

Sem 2: Accident and Allusion in Romantic Writing

Chase, C. Accidents are a theme and a problem for "solitary walkers" and city-dwellers of the late 18th and early 19th century such as Wordsworth, Rousseau, Coleridge, and Shelley. "Love of nature" makes for unexpected storylines. A child attached to lakes happens upon a drowning; a philosopher—botanizing—is knocked out by a Great Dane. How do such moments sustain our belief that the mind is not reliant on chance, fate, or nature? In this course we will examine how accident and choice are linked with meter, images, and echoes of other's writing. So-called Romantics leave us asking where their feelings are allusions, and how our histories are shared.

ENGL 4920 Honors Seminar II

Spring. 4 credits. Open to students in the Honors Program in English or related fields, or by permission of instructor.

Sem 1: Formalist Analysis of Poetry and Prose

F. Bogel. Formalist criticism made its first significant appearance in England and America in the 1930s and 1940s under the label "The New Criticism." Since then, its fortunes have fallen and risen several times, and it has been revised, rejected, adapted, vilified, and much else, surviving mainly in the techniques of "close reading," or detailed analysis of the linguistic features of poetry and prose. This seminar, focusing on English and American poems and prose works, will explore the possibilities, assumptions, strategies, and limitations of contemporary formalist analysis, and its relation to other modes of critical analysis such as psychoanalytic criticism, feminist and gender criticism, and deconstruction. Readings in criticism and theory will combine with critical analysis of poetry and prose. A principal aim of the seminar is to deepen and enrich the interpretive skills that will be put to work in students' honors theses.

Sem 2: Defenses of Poetry

D. Fried. Liars, dreamers, lunatics, rebels, sorcerers, slackers, zealots, pervers: poets have been called many harsh names from Plato to the present. We will study charges brought against poetry and hear the case for the defense from such advocates as Sidney, Dryden, Wordsworth, Shelley, Arnold, Stevens, Moore, Kermode, and Kinzie. The trial includes debates about particulars and universals, poetic language and everyday speech, sincerity and imagination, verseforms and emotion, authenticity and ambiguity, pleasure and politics. We will call to the witness stand poets, literary theorists, philosophers, and a few novelists, film critics, and cognitive scientists. Readings may include Shakespeare, Spenser, Donne, Milton, Pope, Gray, Coleridge, Keats, Tennyson, Hardy, Dickinson, Whitman, Frost, Williams, Moore, Stevens, Woolf, James, and others.

ENGL 4930 Honors Essay Tutorial I

Fall or spring. 4 credits. Prerequisites: senior standing and permission of director of the Honors Program.

ENGL 4940 Honors Essay Tutorial II

Fall or spring. 4 credits. Prerequisites: ENGL 4930 and permission of director of the Honors Program.

ENGL 4950 Independent Study

Fall or spring. 2-4 credits. Prerequisites: permission of departmental advisor and director of undergraduate studies.

Courses Primarily for Graduate Students

Permission of the instructor is a prerequisite for admission to courses numbered in the 6000s. These are intended primarily for graduate students, although qualified undergraduates are sometimes admitted. Undergraduates seeking admission to a 6000-level course should consult the instructor. The list of courses given below is illustrative only; a definitive list, together with course descriptions and class meeting times, is published in a separate department brochure before course enrollment each semester.

Graduate Courses in English 2009-2010

Fall

ENGL 6000 Colloquium for Entering Students

A. Galloway.

ENGL 6110 Old English (also ENGL 3110)

S. Zacher.

ENGL 6151 Visionaries and Vision Literature in the Middle Ages

A. Galloway.

ENGL 6207 Black Feminist Theories (also ASRC 6207)

C. Boyce Davies.

ENGL 6281 Elizabethan and Jacobean Drama and Criticism

J. Mann.

ENGL 6330 Satire, Sensibility, Imitation, and Mechanism in 18th-Century Literature

F. Bogel.

ENGL 6390 Studies in Romantic Literature: Writers of the Revolution

R. Parker.

ENGL 6401 Africana Thought (also ASRC 6400)

G. Farred.

ENGL 6515 Ariosto, Rabelais, Spenser (also ENGL 4515, COML/ROMS 4515/6515)

W. Kennedy.

ENGL 6760 Theory and Poetics of the Novel

H. Shaw.

ENGL 6792 Theory of the Lyric (also ENGL 6792)

J. Culler.

ENGL 6830 Contemporary Global Fiction (also COML 6050)

W. Cohen.

ENGL 6931 Human Rights

E. Anker.

ENGL 6995 Race and Time

S. Wong.

ENGL 7020 Decolonization and Culture: Key Issues in Contemporary Theory

S. Mohanty.

ENGL 7800 M.F.A. Seminar: Poetry

L. Van Clief-Stefanon.

ENGL 7801 M.F.A. Seminar: Fiction

J. Lennon.

ENGL 7850 Close Reading for Writers: American Realisms, American Unrealisms

S. Vaughn.

Spring

ENGL 5850 Linguistic Theory and Poetic Structure (also ENGL 2960, LING 2850/5850)

J. Bowers.

ENGL 6120 Beowulf (also ENGL 3120)

T. Hill.

ENGL 6190 Chaucer and Gower

A. Galloway.

ENGL 6290 Milton: Authorship and Transgression

R. Kalas.

ENGL 6320 Studies in 18th-Century Literature: Key Texts of Modernity

L. Brown.

ENGL 6402 The Politics of Theory (also ASRC 6401)

G. Farred.

ENGL 6411 After the End: Literature in the Ashes of History

C. Caruth.

ENGL 6551 Decadence (also ENGL 3550, COML/FGSS 3550/6551)

E. Hanson.

ENGL 6571 Modernist Feminism, Feminist Modernism (also FGSS 6571)

M. Hite.

ENGL 6611 What Is a Just Society? Native American Philosophies and the Limits of Capitalism's Imagination (also AMST 6611)

E. Cheyfitz.

ENGL 6772 Spaces of Cultural Studies

J. Juffer.

ENGL 7810 MFA Seminar: Poetry

K. McClane.

ENGL 7811 MFA Seminar: Fiction

E. Quinonez.

ENGL 7850 Reading for Writers: Contemporary Poetry and Poetics.

A. Fulton.

EUROPEAN STUDIES MINOR

Sydney Van Morgan, coordinator

Students from any college may choose an undergraduate minor in European studies to complement any major. The purpose of the minor is to provide a coherent structure for students with an interest in interdisciplinary study in the field of European studies.

The minor has three tracks: European politics, economics, and society; modern European history; and European culture. The requirements for the minor are:

1. Competence in at least one modern European language, Romance, Germanic, or Slavic (i.e., completion of a fifth-semester course or equivalent with a grade of at least B-, or demonstration of an advanced level of competence in an oral proficiency interview test where available).

2. Completion of an interdisciplinary core course:

GOVT/SOC 3413 Modern European Society and Politics (SBA-AS)

Fall. 4 credits. S. Van Morgan.

Under certain conditions, students may be permitted to substitute other courses for those listed above.

3. Completion of one course in modern (post-1789) European history.
4. Three additional courses in any of the three areas, which may include a senior seminar (4000 level).
 - a. Courses in European and comparative politics; anthropology; sociology, feminist, gender and sexuality (FGSS) studies; and related courses in the School of Hotel Administration, the College of Agriculture and Life Sciences, and the School of Industrial and Labor Relations.
 - b. Courses in modern European history (post-1789).
 - c. Courses in (post-1789) English and European literatures, comparative literature, semiotics, FGSS, fine arts, architecture, music, philosophy, and film and theatre arts.

Only two courses may be used to satisfy requirements for both the major and the minor. Courses satisfying the breadth and distribution requirements in the College of Arts and Sciences, however, may be applied to the minor. Students interested in conducting research in Europe may apply for the Frederic Conger Wood or Susan R. Tarrow undergraduate research fellowship in their junior year. All minors are encouraged to participate in the Language House Program, the Model European Union simulation, and study abroad. Courses taken abroad may be applied to the minor if they are approved for Cornell credit. Undergraduates in the College of Arts and Sciences can major in European Studies through the independent major or the College Scholar Program.

For a complete list of relevant courses and seminars, departmental advisors, and any further information, contact Sydney Van Morgan, coordinator of the European Studies minor, at the Cornell Institute for European Studies, 120 Uris Hall, 255-7592, sydney.vanmorgan@cornell.edu, www.einaudi.cornell.edu/Europe.

FEMINIST, GENDER, & SEXUALITY STUDIES

Core faculty: A. Basu, S. Bem, L. Benería, D. Castillo, I. DeVault, S. Feldman, M. Fernandez, J. Fortune, J. E. Gainor, D. Ghosh, E. Hanson, M. Hite, C. Howie, J. Juffer, M. Katzenstein, P. Liu, K. Long, K. March, S. Martin, K. McCullough, M. B. Norton, J. Peraino, M. Raskolnikov, S. Samuels, D. Schrader, S. Sethi, A. Villarejo, S. Warner, R. Weil, D. Woubshet

Cross-listing faculty: A. Alexandridis, E. Baptist, J. Bernstock, F. Blau, L. Bogel, C. Boyce-Davies, J. Byfield, T. Carroll, D. Chang, K. Cohen, B. Correll, M. Evangelista, Z. Fahmy, M. Greenberg, S. Haenni, K. Haines-Eitzen, P. Hyams, C. Lazzaro, T. Loos, S. Mettler, A. Parrot, R. Prentice, S. Pritchard, M. Rossiter, N. Russell, N. Sakai, N. Salvato, S. Sangren, R. Savin-Williams, N. Sethi, A. M. Smith, M. C. Vallois, L. Van Buskirk, M. Warner, M. Washington, S. Wong

Introduction to the Program

The Feminist, Gender, & Sexuality Studies Program (FGSS) is an interdisciplinary program in the College of Arts and Sciences that seeks to deepen our understanding of gender and sexuality. Since its founding in 1972 as Women's Studies, the Program has integrated the study of gender with complex structures of power and inequality including race, sexuality, class, and nation. Over the past several decades, the curriculum has also increasingly broadened its scope theoretically and methodologically to encompass cultural, historical, literary, scientific, and quantitative analysis. Students find that these innovative methods and theories enhance their lifelong personal and intellectual growth, as well as their professional development insofar as they prepare students for future study or work in a wide variety of fields: law, medicine, social policy, art, psychology, literature, and so on.

The Program is built around several assumptions about the study of gender and sexuality. First, understandings of sex, sexuality, and gender are neither universal nor immutable; to study them is to gain a fuller understanding of human behavior, culture and society across times and places as well as to gain a sense of how these social constructions shape us as individuals. Second, gender and sexuality are best understood when examined in relation to one another by learning about women and men of different economic classes, sexual orientations, and cultural and racial backgrounds. Third, even the most current knowledge derived from the humanities, social sciences and natural sciences is not as impartial, objective, or neutral but instead emerges out of particular historical and political contexts. Students, as a consequence, transfer the critical and analytical skills they acquire in FGSS courses to other courses and activities beyond Cornell.

Program Offerings

Feminist, Gender, & Sexuality Studies offers an undergraduate major, an undergraduate minor, and a graduate minor. Undergraduate students in the College of Arts and Sciences who wish to major in FGSS may apply directly to the program. Undergraduate students in other colleges at Cornell will need to work out special arrangements and should speak to FGSS's director of undergraduate studies (DUS).

The Undergraduate Major: FGSS

1. **Prerequisite courses:** Before applying to the major, the student must complete any two FGSS courses with a grade of B- or better. For FGSS courses that are cross-listed with another department, students may register through FGSS or the cross-listing department. Suggested entry-level courses include any FGSS course at the 2000 level, especially 2010 and 2020, both

of which are required for completion of the major. FGSS courses at the 2000 level or above may count as both prerequisites and as part of the FGSS major. First-year writing seminars may count as prerequisites but not as part of the major.

2. Required course work:

- a. A minimum of 36 credits in FGSS courses with a grade of C- or higher is required for the major. For FGSS courses that are cross-listed, students may register through FGSS or the cross-listing department.
- b. These 36 credits must include the following three courses:
 - FGSS 2010 Introduction to Feminist, Gender, and Sexuality Studies
 - FGSS 2020 Introduction to Feminist, Gender, and Sexuality Theories
 - FGSS 4000 Senior Seminar in Feminist, Gender, and Sexuality Studies
- c. The 36 credits must also include at least one FGSS course with a significant focus on each of the following three categories: (Note: Although a given course may satisfy one, two, or even three of these categories, a given student must take at least two courses to fulfill this requirement):
 - LBG studies
 - Intersecting structures of oppression: race, ethnicity, and/or class
 - Global perspectives: Africa, Asia, Latin America, or Middle East, by itself or in a comparative or transnational framework. Students may choose from the list in the course catalog or at the FGSS office.

A student with a double major may count up to three FGSS courses toward the FGSS major that she/he is simultaneously counting toward a second major.

The Honors Program: To graduate with honors, a student majoring in FGSS must complete a senior thesis under the supervision of an FGSS faculty member and defend that thesis orally before an honors committee. To be eligible, a student must have at least a cumulative 3.0 GPA in all course work and a 3.3 GPA in all courses applying to their FGSS major. Students interested in the honors program should consult the DUS late in the spring semester of their junior year, or very early in the fall semester of their senior year.

The FGSS Undergraduate Minor

Undergraduate students in any college at Cornell may minor in Feminist, Gender, & Sexuality Studies in conjunction with a major defined elsewhere in the university. The minor consists of five FGSS courses with a grade of C- or higher, through FGSS or the cross-listing department that are completed with a grade of C- or above, none of which may be counted toward the student's non-FGSS major. An exception to this rule may be made for students in the contract colleges, who may petition the FGSS DUS to count one course from their major toward the FGSS minor. First-year writing seminars may not be included within the five required courses. Students wishing to minor in FGSS should see the DUS. The five courses required for the FGSS Undergraduate Minor must include:

FGSS 2010 Introduction to Feminist, Gender, and Sexuality Studies

FGSS 2020 Introduction to Feminist, Gender, and Sexuality Theories

Any FGSS course that satisfies at least one of the three categories required for a major as defined above.

Any two additional FGSS courses of the student's choice.

The LGBT Undergraduate Minor

FGSS serves as home to the Lesbian, Gay, Bisexual, & Transgender (LGBT) Studies Program, which offers an undergraduate minor as well as a graduate minor. The undergraduate minor consists of four courses. For a complete listing of all courses that will fulfill this minor please see the LGBT Studies portion of this catalog.

1. First-Year Writing Seminars

FGSS 1060 FWS: Women and Writing (also ENGL 1060)

Fall and spring, 3 credits. Staff.

2. Courses

FGSS 2010 Introduction to Feminist, Gender, and Sexuality Studies (CA-AS)

Fall and spring, 4 credits. J. Juffer and S. Martin.

Feminist, Gender, & Sexuality Studies is an interdisciplinary program focused on understanding the impact of gender and sexuality on the world around us and on the power hierarchies that structure it. This course focuses mainly on the experiences, historical conditions, and concerns of women as they are shaped by gender and sexuality both in the present and the past. Students read a variety of texts, personal narratives, historical documents, and cultural criticism across a range of disciplines. In doing so students consider how larger structural systems of both privilege and oppression affect individuals' identities, experiences, and options, and simultaneously examine forms of agency and action taken by women in the face of these larger systems.

FGSS 2020 Introduction to Feminist, Gender, and Sexuality Theories (also VISST 2020) (CA-AS)

Spring, 4 credits. H. Hoehchst.

Introduces students to critical approaches in feminist scholarship to the cultural, socioeconomic, and political situation(s) of women. Particular attention is paid to the conceptual challenges and dangers posed by attempts to study women without taking account of relations between race, class, and gender in ideological and social formations. Readings draw on work in various disciplines and include literary texts and visual images.

[FGSS 2090 Seminar in Early American History (also AMST/HIST 2090)

Fall, 4 credits. Next offered 2010-2011. M. B. Norton.]

[FGSS 2120 African American Women: 20th Century (also AMST/HIST 2120)

Spring, 4 credits. Next offered 2010-2011. M. Washington.]

[FGSS 2140 Biological Basis of Sex Differences (also BIOAP 2140, BSOC 2141) (PBS)

Fall, 3 credits. Offered alternate years. Next offered 2010-2011. J. Fortune.]

[FGSS 2190 Women and Gender in South Asia (also ASIAN 2219, HIST 2190) @ (HA-AS)

Fall, 4 credits. Next offered 2010-2011. D. Ghosh.]

[FGSS 2460 Contemporary Narratives by Latina Writers (also LSP/SPAN 2460)

Fall, 3 credits. Next offered 2011-2012. Staff.]

FGSS 2490 Feminism and Philosophy (also PHIL 2490) (KCM-AS)

Fall, 4 credits. N. Sethi.
For description, see PHIL 2490.

[FGSS 2730 Women in American Society, Past and Present (also AMST/HIST 2730)

Fall, 4 credits. Next offered 2010-2011. M. B. Norton.]

[FGSS 2760 Desire (also COML/ENGL 2760, THETR 2780)

Spring, 4 credits. Next offered 2011-2012. E. Hanson.]

FGSS 2840 Sex, Gender, and Communication (also COMM 2840)

Fall, 3 credits. L. Van Buskirk.
For description, see COMM 2840.

[FGSS 3130 Special Topics in Drama and Performance (also THETR 3130)

Fall, 4 credits. Next offered 2010-2011. S. Warner.]

[FGSS 3040 Sex, Power, and Politics (also GOVT 3043)

Spring, 4 credits. Next offered 2010-2011. S. Martin.]

[FGSS 3070 African American Women in Slavery and Freedom (also AMST/HIST 3030) # (HA-AS)

Spring, 4 credits. Next offered 2010-2011. M. Washington.]

[FGSS 3130 Special Topics in Drama and Performance (also THETR 3130)

Fall, 4 credits. Next offered 2010-2011. S. Warner.]

FGSS 3210 Sex and Gender in Cross-Cultural Perspective (also ANTHR 3421) @ (SBA-AS)

Fall, 4 credits. K. March.
For description, see ANTHR 3421.

[FGSS 3221 Lives of Scientists and Engineers (also STS 3221)

Spring, 4 credits. Next offered 2010-2011. M. Rossister.]

FGSS 3250 Queer Performance (also THETR 3260) (LA-AS)

Fall, 4 credits. S. Warner.
For description, see THETR 3260.

FGSS 3251 History of the Family in the U.S. (also AMST/HIST 3251) (HA-AS)

Spring, 4 credits. T. Carroll.
For description, see HIST 3251.

[FGSS 3370 Contemporary American Theater (also THETR/AMST 3370)

Spring, 3 credits. Next offered 2010-2011. S. Warner.]

FGSS 3440 Male and Female in Chinese Culture and Society (also ANTHR 3554) @ (SBA-AS)

Fall, 4 credits. S. Sangren.
For description, see ANTHR 3554.

[FGSS 3450 American Film (also AMST/ENGL 3440, VISST 3645) (LA-AS)

Spring, 4 credits. Next offered 2010-2011. S. Haenni.]

FGSS 3470 Asian American Women's History (also AAS/AMST/HIST 3470) (CA-AS)

Spring, 4 credits. D. Chang.
For description, see HIST 3470.

[FGSS 3480 Studies in Women's Literature (also AMST 3431, ENGL 3480) (LA-AS)

Spring, 4 credits. Next offered 2010-2011. K. McCullough.]

FGSS 3500 Contemporary Issues in Women's Health (also PAM 3500)

Spring, 3-5 variable credits. A. Parrot.
For description, see PAM 3500.

FGSS 3510 Caribbean Literature (also ASRC/ENGL 3510) (LA-AS)

Fall, 4 credits. C. Boyce-Davies.
For description, see ASRC 3510.

FGSS 3550 Decadence (also COML/ENGL 3550) (LA-AS)

Spring, 4 credits. E. Hanson.
For description, see ENGL 3550.

[FGSS 3580 Theorizing Gender and Race in Asian Histories and Literatures (also ASIAN 3388/6688, COML 3980/6680) @ (CA-AS)

Spring, 4 credits. Next offered 2010-2011. N. Sakai.]

FGSS 3590 Consuming Passions: Media, Space, and the Body (also ENGL 3590) (CA-AS)

Spring, 3 credits. J. Juffer.
This course examines the intersections of gender, sexuality, space, and popular culture. Ranging across media—film, literature, television, and music—the class analyzes how these different forms represent and constitute gendered and sexed bodies. How does the Lifetime channel, for example, represent itself as a woman's space? Spike as a man's space? Are these distinctions breaking down, resulting in more hybrid genres? How do race, ethnicity, age, and class figure in? We connect media to sites of production, distribution, and consumption, such as the theater, the home, and cyberspace with particular emphasis on the affective and often passionate realm of consumption. Questions of access are considered: which technologies have provided access to marginalized groups, and on what terms? What are the political possibilities of popular culture, and what are the intersections of politics and pleasure?

FGSS 3600 Gender and Globalization (also CRP/LATA 3650) (SBA-AS)

Fall, 3 credits. L. Benería.
This course invites students to think globally about gender issues and to trace the connections between global, national and local perspectives.

[FGSS 3630 Age of Realism and Naturalism (also AMST/ENGL 3630) (LA-AS)

Spring, 4 credits. Next offered 2011-2012. K. McCullough.]

[FGSS 3680 Marriage and Sexuality in Medieval Europe (also HIST 3680) # (HA-AS)]

Spring. 4 credits. Next offered 2010–2011. P. Hyams.]

[FGSS 3690 Fast-Talking Dames and Sad Ladies (also ENGL/FILM 3690) (LA-AS)]

Spring. 4 credits. L. Bogel. For description, see ENGL 3690.

[FGSS 3700/6700 Gender and Age in Archaeology (also ANTHR/ARKEO 3269/6269)]

Fall. 4 credits. Next offered 2010–2011. N. Russell.]

[FGSS 3702 Desire and Cinema (also COML/ENGL 3702) (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. E. Hanson.]

[FGSS 3720 Food, Gender, Culture (also ENGL 3721, AMST 3720)]

Fall. 4 credits. K. McCullough.

In addition to nourishing the body, food operates as a cultural system that produces and reflects group and individual identities. In this class we will examine foodways—the behaviors and beliefs attached to the production, distribution, and consumption of food—to explore the way food practices help shape our sense of gender, race, sexual orientation, and national identity. In doing so we will focus primarily on literature and film but will also range into the fields of anthropology, sociology, and history. Some questions under discussion: How do factors such as gender, class, race, and religion shape the foods we eat and the circumstances in which we eat them? How do writers use the language of food to explore issues such as gender, sexuality, class and race?

[FGSS 3850 Gender and Sexual Minorities (also HD 3840)]

Fall. 3 credits. K. Cohen. For description, see HD 3840.

[FGSS 3990/3991 Undergraduate Independent Study]

Fall and spring. 1–4 credits. Prerequisites: one course in Feminist, Gender, and Sexuality Studies and permission of a Feminist, Gender, and Sexuality Studies faculty member. Staff.

[FGSS 4000 Senior Seminar in Feminist, Gender, and Sexuality Studies]

Fall. 4 credits. Prerequisite: requirement for and limited to Feminist, Gender, and Sexuality Studies majors and undergraduate minors. K. McCullough.

Although the topic/focus of this course surely varies with the instructor, it is always treated as a broad capstone course for majors.

[FGSS 4021 Bodies in Medicine, Science, and Culture (also BSOC/STS 4021)]

Spring. 4 credits. Next offered 2010–2011. R. Prentice.]

[FGSS 4040 Women Artists (also ARTH 4610) (LA-AS)]

Fall. 4 credits. J. Bernstock. For description, see ARTH 4610.

[FGSS 4060 The Culture of Lives (also ANTHR 4406) @ (CA-AS)]

Spring. 4 credits. Next offered 2010–2011. K. March.]

[FGSS 4100 Health and Survival Inequalities (also DSOC/SOC 4100) (SBA/AS)]

Fall. 4 credits. A. Basu. For description, see DSOC 4100.

[FGSS 4140 Bodies in the Middle Ages: Embodiment, Incarnation, Performance (also ENGL 4140) # (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. M. Raskolnikov.]

[FGSS 4141 Women's Activism and Social Change in the 20th-Century U.S. (also HIST 4141) (HA-AS)]

Fall. 4 credits. T. Carroll. For description, see HIST 4141.

[FGSS 4160 Gender and Sexuality in Southeast Asia (also ASIAN 4416, HIST 4160/6160) @ (CA-AS)]

Fall. 4 credits. Next offered 2011–2012. T. Loos.]

[FGSS 4210 Theories of Reproduction (also DSOC/SOC 4210) (SBA-AS)]

Spring. 4 credits. A. Basu. For description, see DSOC 4210.

[FGSS 4220 New York Women (also HIST/STS 4221) (HA-AS)]

Fall. 4 credits. M. Rossiter. For description, see STS 4221.

[FGSS 4231 Gender and Technology (also BSOC/HIST/STS 4231) (HA-AS)]

Spring. 4 credits. S. Pritchard. For description, see STS 4231.

[FGSS 4232 Images of Women in Antiquity (also ARTH 4232, CLASS 4732) # (CA-AS)]

Spring. 4 credits. Next offered 2011–2012. A. Alexandridis.]

[FGSS 4270 Parody (also THETR 4200/6200) (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. N. Salvato.]

[FGSS 4330 The Female Dramatic Tradition (also THETR 4360/6360, FGSS 6330)]

Spring. 4 credits. Next offered 2010–2011. S. Warner.]

[FGSS 4440 Historical Issues of Gender and Science (also STS 4441) (CA-AS)]

Spring. 4 credits. M. Rossiter. For description, see STS 4441.

[FGSS 4450 American Men (also AMST/HIST 4440) (HA-AS)]

4 credits. Next offered 2010–2011. E. Baptist.]

[FGSS 4460 Women in the Economy (also ILRLE 4450, ECON 4570)]

Spring. 4 credits. F. Blau. For description, see ILRLE 4450.

[FGSS 4480 Global Perspectives on Violence against Women (also PAM 4440)]

Spring. 3 credits. Next offered 2010–2011. A. Parrot.]

[FGSS 4507 Black Women Writers: International Dimensions (also ASRC 4507/6507, FGSS 6507) (LA-AS)]

Fall. 4 credits. C. Boyce-Davies. For description, see ASRC 4507.

[FGSS 4510 Women in Italian Renaissance Art (also ARTH 4450) # (HA-AS)]

Spring. 4 credits. Next offered 2010–2011. C. Lazzaro.]

[FGSS 4530 20th-Century American Women Writers of Color (also AAS/AMST/ENGL 4530) (LA-AS)]

Fall. 4 credits. S. Wong. For description, see ENGL 4530.

[FGSS 4610 Sexuality and the Law (also AMST/GOVT 4625, FGSS 7620, GOVT 7625)]

Spring. 4 credits. Next offered 2011–2012. A. M. Smith.]

[FGSS 4630 Feminist Theory/Law and Society (also AMST 4590, GOVT 4635)]

Fall. 4 credits. Next offered 2010–2011. A. M. Smith.]

[FGSS 4640 Women in the Modern Middle East (also HIST/NES 4642)]

Spring. 4 credits. Next offered 2010–2011. Z. Fahmy.]

[FGSS 4740/6740 Feminism, Post-Feminism, Cyberfeminism (also ARTH 4740/6740)]

Spring. 4 credits. Next offered 2011–2012. M. Fernandez.]

[FGSS 4751 Advanced Seminar in the 20th Century: AIDS Literature (also ENGL 4750, AMST 4755)]

Spring. 4 credits. D. Woubshet. For description, see ENGL 4751.

[FGSS 4770 Intersections in Lesbian Fiction (also AMST/ENGL 4780)]

4 credits. Next offered 2011–2012. K. McCullough.]

[FGSS 4790 Advanced Seminar in American Literature: Visual Culture and Women's Literature (also AMST/ENGL 4790, ARTH 4979, VISST 4800)]

Fall. 4 credits. Next offered 2010–2011. S. Samuels.]

[FGSS 4791 Transgender and Transexuality (also ENGL 4791) (LA-AS)]

Fall. 4 credits. Next offered 2010–2011. M. Raskolnikov.]

[FGSS 4950 Gender and Power in England: 1600–1800 (also HIST 4950) # (CA-AS)]

Spring. 4 credits. R. Weil. For description, see HIST 4950.

[FGSS 4990/4991 Senior Honors Thesis]

Fall and spring. 1–8 credits. Prerequisite: FGSS seniors only. Staff. To graduate with honors, FGSS majors must complete a senior thesis under the supervision of a FGSS faculty member and defend that thesis orally before an honors committee. To be eligible for honors, students must have at least a cumulative GPA of 3.0 in all course work and a 3.3 average in all courses applying to their FGSS major. Students interested in the honors program should consult the DUS late in the spring semester of their junior year or very early in the fall semester of their senior year.

[FGSS 6030 The Question of Feminist and Queer Criticism in Premodern Studies (also ENGL 6030)]

Spring. 4 credits. Next offered 2011–2012. M. Raskolnikov.]

[FGSS 6040 Passionate Politics: Affect, Protest, Performance (also THETR 6060)]

Spring. 4 credits. Next offered 2010–2011. S. Warner.]

[FGSS 6050 Camp, Kitsch, and Trash (also ENGL 6510, THETR 6050)]

Spring. 4 credits. N. Salvato.
For description, see THETR 6050.

[FGSS 6060 Psychology of Adolescence in Case Study (also EDUC 6170)]

Spring. 3 credits. Next offered 2010–2011. D. Schrader.]

[FGSS 6140 Gender and International Development (also CRP 6140)]

Spring. 3 credits. Next offered 2010–2011. L. Beneria.]

[FGSS 6170 Feminist Methodology (also GOVT 6423)]

Spring. 4 credits. Next offered 2010–2011. S. Martin.

This course seeks to familiarize students with primarily qualitative methodological tools to be applied to individual research questions.]

[FGSS 6180 The Psychology of Moral Development and Education (also EDUC 6160)]

Fall. 3 credits. Next offered 2010–2011. D. Schrader.]

[FGSS 6207 Black Feminist Theories (also ASRC/ENGL 6207, COML 6465)]

Fall. 4 credits. C. Boyce-Davies.
For description, see ASRC 6207.

[FGSS 6232 Images of Women in Antiquity (also ARTH 6232, CLASS 7732)]

Spring. 4 credits. Next offering 2011–2012. A. Alexandridis.]

[FGSS 6240 Epistemological Development and Reflective Thought (also EDUC 6140)]

Fall. 3 credits. D. Schrader.
For description, see EDUC 6140.

[FGSS 6304 Marriage and Divorce in the African Context (also ASRC 6304)]

Fall. 4 credits. J. Byfield.
For description, see ASRC 6304.

[FGSS 6310 Sex and Gender in Cross-Cultural Perspective (also ANTHR 6421)]

Fall. 4 credits. K. March.
For description, see ANTHR 6421.

[FGSS 6360 Comparative History of Women and Work (also ILRIC 6360)]

Spring. 4 credits. Next offered 2010–2011. I. DeVault.]

[FGSS 6370 Parody (also THETR 4200/6200)]

Spring. 4 credits. Next offered 2010–2011. N. Salvato.]

[FGSS 6400 Historical Issues of Gender and Science (also HIST 6410, STS 6401)]

Fall. 4 credits. S. Seth.
For description, see STS 6401.

[FGSS 6470 The Theatricality of Gender, Philosophy, and French Literature (also FREN 6470)]

Fall. 4 credits. M. C. Vallois.
For description, see FREN 6470.

[FGSS 6540 Queer Theory (also COML/ENGL 6540)]

4 credits. Next offered 2010–2011. E. Hanson.]

[FGSS 6544 Gender and Politics (also GOVT 6544)]

Fall. 4 credits. S. Martin and S. Mettler.
For description, see GOVT 6544.

[FGSS 6550 Modernist Fiction and the Erotics of Style (also ENGL 6550)]

Spring. 4 credits. Next offered 2010–2011. E. Hanson.]

[FGSS 6551 Decadence (also ENGL 6551)]

Spring. 4 credits. E. Hanson.
For description, see ENGL 6551.

[FGSS 6571 Modernist Feminism, Feminist Modernism (also ENGL 6571)]

Spring. 4 credits. M. Hite.
For description, see ENGL 6571.

[FGSS 6580 Theorizing Gender and Race in Asian Histories and Literatures (also ASIAN 6880, COML 6680)]

Spring. 4 credits. Next offered 2010–2011. N. Sakai.]

[FGSS 6610 Erotics of Visuality (also ENGL 6610)]

Spring. 4 credits. Next offered 2011–2012. E. Hanson.]

[FGSS 6700 Gender and Age in Archeology (also ANTHR/ARKEO 6269)]

Spring. 4 credits. Next offered 2010–2011. N. Russell.]

[FGSS 6811 James Baldwin (also AMST/ENGL 6811)]

Fall. 4 credits. Next offered 2010–2011. D. Woubshet.]

[FGSS 6990 Topics in Feminist, Gender, and Sexuality Studies]

Fall and spring. Variable credit. Staff. Independent reading course for graduate students on topics not covered in regularly scheduled courses. Students develop a course of readings in consultation with a faculty member in the field of Feminist, Gender, and Sexuality Studies who has agreed to supervise the course work.

[FGSS 7620 Sexuality and the Law (also FGSS 4610, 7625, GOVT 4625)]

Spring. 4 credits. Next offered 2011–2012. A. M. Smith.]

FILM

See "Department of Theatre, Film, and Dance."

FIRST-YEAR WRITING SEMINARS

For information about the requirements for writing seminars and descriptions of seminar offerings, see the John S. Knight Institute web site: www.arts.cornell.edu/knight_institute.

FRENCH

See "Romance Studies."

GERMAN STUDIES

L. Adelson; C. Alm (Swedish); B. Buettner, associate language program director; P. Gilgen; A. Groos; P. U. Hohendahl; C. Hosea (Dutch); G. Lischke, language program director and director of undergraduate studies; G. Matthias; D. McBride; P. McBride, acting director of graduate studies; A. Schwarz, department chair; G. Waite. Emeritus: D. Bathrick, H. Deinert.

The Department of German Studies offers students a wide range of opportunities to explore the literature and culture of German-speaking countries, whether as part of their general education, a major in German Studies, a double major, or a German minor involving another discipline, or as preparation for graduate school or an international professional career. Courses are offered in German as well as in English; subjects range from medieval to contemporary literature and from film and visual culture to intellectual history, music, history of psychology, and feminist, gender, and sexuality studies.

The course offerings in German begin with GERST 1210–1220, 1230 (introductory language level). Students then continue with intermediate-level courses, which provide further grounding in the language and in German literature and cultural studies. GERST 2060 provides instruction for German in the culture of business, leading to certification. On the advanced level (3000 level or above), we offer thematically oriented courses that include intensive language work (3000–3200); literature and culture study courses in German, including the senior seminar; and seminars of interdisciplinary interest taught in English. Addressing a broad spectrum of topics in German culture, our courses appeal to German majors and other qualified students alike.

The department's offerings in English begin with a series of first-year writing seminars introducing various aspects of German literature (e.g., the fairy tale and Romantic consciousness or 20th-century writers such as Kafka, Hesse, Mann, Brecht), theorists such as Marx, Nietzsche, and Freud, issues in mass culture and modernity, problems of German national identity/ies, and cinema and society. Courses in German and English at the 3000 and 4000 levels explore such topics as the Faust legend, aesthetics from Kant to Heidegger, city topographies, Freud and his legacy, opera from Mozart to Strauss, the German novel, literature and philosophy, political theory and cinema, the Frankfurt School, migration and globalization, and feminist theory. It may be possible to arrange a German section for courses taught in English, either informally or formally (for credit). Students are encouraged to discuss this possibility with instructors.

Sequence of Courses

Courses in German:

Introductory level: GERST 1210–1220, after completion, placement into GERST 1230 or 2000

Intermediate level: GERST 2000, 2020, 2040, and 2060

Advanced level: GERST 3010, 3020, 3060, 3070, 3080, 3100, and 4100

Courses taught in German that are numbered 3000 through 3200 focus on intensive

language study; courses taught in German that are numbered 3210 through 3500 focus on studying literature and other forms of cultural expression.

Courses in German or English: further 3000- and 4000-level literature and culture courses (see course descriptions)

Advanced Standing

Students with an AP score of 4 or better are automatically granted 3 credits in German. Students with an AP score of 4 or better, an LPG score of 65 or higher, or an SAT II score of 690 or higher must take the CASE exam for placement in courses above GERST 2000. Students coming to Cornell with advanced standing in German and/or another subject are encouraged to consider a double major and to discuss the options with the director of undergraduate studies as early as possible.

Certificate in German Language Study

The Certificate in German Language Study is issued to recognize substantial language study beyond the GERST 2000 level in the Department of German Studies. Students are awarded the certificate after passing three German Studies courses held in German with a grade of B or above. Two of these courses must be at the 3000 level or above. No more than two of the three courses can be taken with the S-U option. Applications for the language certificate may be picked up in the Department of German Studies (183 Goldwin Smith Hall) in February.

Internships

The department works with the USA-Interns program to provide summer internships to qualified students with German companies and agencies. Interested students should contact the language program director, Gunhild Lischke (gl15@cornell.edu, G75 Goldwin Smith Hall, 255-0725), early in the fall semester.

Majors in German Studies

The department offers two options for the major: German literature and culture, and German area studies. The latter is a more broadly defined sequence that includes work in related disciplines. The course of study in either major is designed to give students proficiency in reading, speaking, and writing in German, to acquaint them with German culture, and to help them develop skills in reading, analyzing, and discussing German texts in relevant disciplines with those goals in mind. The department also encourages study abroad. For both majors, there is a wide variety of courses co-sponsored with other departments (Comparative Literature; Government; History; Music; Theatre, Film, and Dance; Feminist, Gender, and Sexuality Studies).

The department encourages double majors and makes every effort to accommodate prospective majors with a late start in German. Students interested in a major should consult the director of undergraduate studies, Gunhild Lischke, G75 Goldwin Smith Hall.

Minor in German Studies

The undergraduate minor in German Studies is intended for students enrolled in any of the seven undergraduate colleges at Cornell who wish to gain a broad understanding of the

culture, literature, and society of German-speaking countries while they are refining their language competence. The minor is designed to provide for breadth while permitting flexibility to emphasize areas of interest in German studies.

To declare the minor, students must have attained competence in German at the GERST 2000 level. Students must complete a minimum of four courses at the 2000 level and above selected from the offerings of the German Studies Department. At least one of these courses must be taught in German at the 3000 level or higher. One of the four courses may be from another department as long as it has a substantial German component. No more than one course per semester taken as part of a study abroad program may be counted toward the minor. GERST 4510-4520 Independent Study may not be counted at all.

Interested students in the German Minor should consult with the department's Director of Undergraduate Studies, Gunhild Lischke, G75 Goldwin Smith Hall.

German (Literature and Culture)

Students in this major select courses from the Department of German Studies and may use them to pursue individual interests in literature, film and visual culture, theater and performing arts, music, intellectual and political history, and gender studies, for example. Please consult with the director of undergraduate studies.

Admission: By the end of their sophomore year, prospective majors should have successfully completed GERST 2020, 2040, or 2060.

To complete the major, a student must:

1. Demonstrate competence in the German language by successful completion of two 3000-level courses with intensive language work (GERST 3000-3200) or the equivalent.
2. Complete six courses in the Department of German Studies at the 3000 level or above. One of these must be GERST 4100 Senior Seminar.
3. Select a faculty advisor from the department.

German Area Studies

Students select courses from the Department of German Studies as well as courses with a substantial German component from other departments, such as Comparative Literature; Government; History; Music; Theatre, Film, and Dance; and Feminist, Gender, and Sexuality Studies.

Admission: By the end of their sophomore year, prospective majors should have successfully completed GERST 2020, 2040, or 2060.

To complete the major, a student must:

1. Demonstrate competence in the German language by successful completion of two 3000-level courses with intensive language work (GERST 3000-3200) or the equivalent.
2. Complete six courses with a substantial German component at the 3000 level or above. Three of these must be in the

Department of German Studies, including GERST 4100 Senior Seminar.

3. Select a committee of one or more faculty advisors to help formulate a coherent program of study. One of the advisors must be from the Department of German Studies.

Honors

Honors in German Studies are awarded for excellence in the major, which includes overall grade point average and completion of the honors thesis. Students are awarded either honors (*cum laude*), high honors (*magna cum laude*), or the highest honors (*summa cum laude*) in the program based on the honors advisors' evaluation of the level and the quality of the work completed toward the honors degree. The honors distinction will be noted on the student's official transcript and will also be indicated on the student's diploma.

Prerequisites for admission. Students must have upperclass standing, an overall GPA of a B or higher, and a GPA of 3.5 or higher in the major. Students must first consult with the director of undergraduate studies in German Studies regarding eligibility for the honors program.

Procedure. Students who wish to be considered for honors ideally should apply to the director of undergraduate studies no later than the second term of the junior year. Students who are off campus in their junior year must apply by the third week of classes in the first semester of their senior year. Students should secure the consent of a faculty member to serve as the director of both the reading course (GERST 4530) and the writing of a thesis (GERST 4540). With the help of their thesis advisor, students choose an area of special interest and identify at least one other faculty member who is willing to serve on the honors committee. An oral thesis defense concludes the process.

Study Abroad in a German-Speaking Country

The Department of German Studies strongly supports study abroad as an opportunity for students to live and study in the German cultural context. The experience of living abroad promotes enduring personal growth, provides new intellectual perspectives through cultural immersion, and opens up academic and professional opportunities.

Students interested in studying abroad are encouraged to consider the Berlin Consortium, of which Cornell is a member. The program is run in conjunction with the Free University of Berlin and is of very high caliber. Six weeks of an intensive language practicum held at the Berlin Consortium center are followed by one or two semesters of study at the university. Participants enroll in regular courses at the university. Assistance in finding internships between semesters may be available to students staying for an entire academic year. Four semesters of German language study are prerequisite for participating in the program; ideally the last of these courses should be at the 3000 level.

Students interested in this or other study abroad options in Germany, Austria, or Switzerland should consult the language program director, Gunhild Lischke (G75 Goldwin Smith Hall, 255-0725, gl15@cornell.edu).

First-Year Writing Seminars

Consult the John S. Knight Institute brochure for course times, instructors, and descriptions.

Courses Offered in German

GERST 1210 Exploring German Contexts I

Fall or spring. 4 credits. Intended for students with no prior experience in German or language placement test (LPG) below 37, or SAT II below 370. G. Lischke, G. Matthias, and staff.

Students develop basic abilities in listening, reading, writing, and speaking German in meaningful contexts through interaction in small group activities. Course materials including videos, short articles, poems, and songs provide students with varied perspectives on German language, culture, and society.

GERST 1220 Exploring German Contexts II

Fall or spring. 4 credits. Prerequisite: GERST 1210, LPG 37-44, or SAT II 370-450. G. Matthias, G. Lischke, and staff.

Students build on their basic knowledge of German by engaging in intense and more sustained interaction in the language. Students learn more advanced language structures allowing them to express more complex ideas in German. Discussions, videos, and group activities address topics of relevance to the contemporary German-speaking world.

GERST 1230 Expanding the German Dossier

Fall or spring. 4 credits. *Successful completion of GERST 1210, 1220, and 1230 satisfies Option 2.* Prerequisite: study of German and LPG 45-55 or SAT II 460-580. Staff.

Students continue to develop their language skills by discussing a variety of cultural topics and themes in the German-speaking world. The focus of the course is on expanding vocabulary, reviewing major grammar topics, developing effective reading strategies, improving listening comprehension, and working on writing skills. Work in small groups increases each student's opportunity to speak in German and provides for greater feedback and individual help.

GERST 2000 Germany: Intercultural Context (CA-AS)

Fall or spring. 3 credits. *Satisfies Option 1.* Prerequisite: GERST 1230 or LPG 56-64 or SAT II 590-680, or placement by exam. Staff.

Content-based language course on the intermediate level. Students examine important aspects of present-day German culture while expanding and strengthening their reading, writing, and speaking skills in German. Materials for each topic are selected from a variety of sources (fiction, newspapers, magazines, and the Internet). Units address a variety of topics including studying at a German university, modern literature, Germany online, and Germany at the turn of the century. Oral and written work and individual and group presentations emphasize accurate and idiomatic expression in German. Successful completion of the course enables students to continue with more advanced courses in language, literature, and culture.

GERST 2020 Literary Texts and Contexts (LA-AS)

Spring. 3 credits. *Satisfies Option 1.* Prerequisite: GERST 2000 or equivalent or placement exam. Conducted in German. D. McBride.

Students in this intermediate course read and discuss a number of works belonging to different literary genres by major German-speaking authors such as Kafka, Walser, Brecht, Mann, Frisch, Dürrenmatt, Bachmann, and others. They explore questions of subjectivity and identity in modern society, of human existence as existence in language, and of the representation of history in literary texts. Activities and assignments focus on the development of reading competency in different literary genres, the improvement of writing skills including the accurate use of idiomatic expressions, the expansion of students' German vocabulary, and the systematic review of select topics in German grammar.

GERST 2040 Working with Texts (CA-AS)

Fall or spring. 3 credits. *Satisfies Option 1.* Prerequisite: GERST 2000 or placement by exam (placement score and CASE). D. McBride and A. Schwarz.

Emphasis is on improving oral and written expression of idiomatic German. Enrichment of vocabulary and appropriate use of language in different conversational contexts and written genres. Material consists of readings in contemporary prose, articles on current events, videos, and group projects. Topics include awareness of culture, dependence of meaning on perspective, interviews with native German speakers, German news broadcasts, reading German newspapers on the Internet.

GERST 2060 German in Business Culture (CA-AS)

Fall. 3 credits. *Satisfies Option 1.* Prerequisite: GERST 2000 or placement by examination placement score and CASE. Students without previous knowledge of business German are welcome. G. Lischke.

Students learn German and understand German business culture at the same time. This German language course examines the German economic structure and its major components: industry, trade unions, the banking system, and the government. Participants learn about the business culture in Germany and how to be effective in a work environment, Germany's role within the European Union, the role of the Bundesbank, the importance of trade and globalization, and current economic issues in Germany. The materials consist of authentic documents from the German business world, TV footage, and a business German textbook. At the end of the course, the external Goethe Institut exam "Deutsch für den Beruf" is offered.

GERST 3010 Scenes of the Crime: German Mystery and Detective Fiction (LA-AS)

Fall. 4 credits. *Satisfies Option 1.* Prerequisite: GERST 2020, GERST 2040, GERST 2060, or equivalent or permission of instructor. Taught in German. This course may be counted toward the requirement for 3000-level language work in the major. B. Buettner.

An exploration of German crime, detective, and mystery writing in texts ranging from the early 19th century to contemporary fiction. Authors to be studied may include: Kleist, E. T. A. Hoffmann, Dürrenmatt, Schatten, Süskind, Handke, Ören, Arjouni, Ani, and Glauser. In addition to exercising hermeneutic

skills (and, by extension, that gray matter of which Sherlock Holmes and Hercule Poirot were so fond), this course aims at improving proficiency in aural and reading comprehension, as well as speaking and writing skills, with emphasis on vocabulary expansion, advanced grammar review, and stylistic development. Recommended to students interested in a combined introduction to literature and high-level language training.

[GERST 3020 Youth Culture: Adolescence in German Fiction (LA-AS)]

Spring. 4 credits. *Satisfies Option 1.* Prerequisite: GERST 2020, 2040 or 2060 or equivalent or placement exam, permission of instructor. Taught in German. Next offered 2011-2012. B. Buettner.]

GERST 3080 German Life Style 2.0 (CA-AS)

Spring. 4 credits. *Satisfies Option 1.* Prerequisite: GERST 2020, GERST 2040, GERST 2060, or equivalent or permission of instructor. Taught in German. This course may be counted toward the requirement for 3000-level language work in the major. G. Matthias.

In this course, we will encounter German culture of today in and through Web 2.0. No technical knowledge is required since, in the process, a solid base of knowledge concerning the use of media will be constructed. This knowledge will then be applied practically through discussing aspects of German culture visible in the WWW. The highlight of the course will be an intercultural encounter with a German Class from the University of Osnabrück using Web 2.0 applications. In the produced content, students will become part of the Web 2.0 in German through an intercultural discussion of German life visible in the World Wide Web (WWW).

GERST 3210 After the Fires: Divided Germany 1945-1989 (CA-AS)

Fall. 4 credits. *Satisfies Option 1.* Taught in German. L. Adelson.

Introduction to the history and culture of postwar Germany, the development and unification of the two Germanys, and their societies. The emphasis is on cultural and social institutions as well as political and intellectual debates. Focal topics include responses to the Nazi past, Germany and Europe, protest movements, migration patterns, women, mass media, and popular culture. We will consider contemporary Germany in relationship to both its postwar past and a newly European future. Some films will also be shown.

GERST 3220 German-Jewish Perspectives in the Early 20th Century (CA-AS)

Spring. 4 credits. *Satisfies Option 1.* Prerequisites: any German course at 3000-3200 level or by placement exam. Taught in German. A. Glazova.

The term "modernism" is usually associated with projects of renewal, which "re-write" the world within their own, newly founded language. The early 20th century, when European modernism was in bloom, was also a time of this renewal in the sphere of German-Jewish culture. Specifically Jewish themes such as Hassidic tales or kabbalistic knowledge become for the first time a part of the German literary tradition. While Martin Buber and Franz Rosenzweig's new translation of the Bible is symptomatic, their theological writings and efforts in re-defining Jewish learning are paradigmatic for this renewal.

Simultaneously with Buber and Rosenzweig, Franz Kafka who, as Walter Benjamin once said, did not establish a new religion, began the work of this renewal in his prose. We will begin this class by reading Buber's and Rosenzweig's essays on Judaism and then turn our attention to Kafka's narratives. Finally, we will proceed to Walter Benjamin and Gershom Scholem, in whose works the Jewish thought finds a new strength in face of the imminent catastrophe.

[GERST 3250 The Age of Goethe # (LA-AS)]

Next offered 2011–2012. A. Groos.]

[GERST 3270 Too Much to See: German Literary and Visual Cultures, 1900–1933 (CA-AS)]

Next offered 2011–2012. P. McBride.]

GERST 4100 Senior Seminar: What Is Poetry? (CA-AS)

Fall. 4 credits. *Satisfies Option 1.*

Prerequisites: adequate command of German; any 3000-level course taught in German, or equivalent, or permission of instructor. Readings and discussions in German. P. Gilgen.

The question posed in the title of this course is indeed its guiding thread: What is poetry? What makes a series of words into a poetic utterance? What does it mean to speak poetically? The attempt to answer these questions will proceed on two levels: On the one hand, we will read in depth a series of poems written in German from the Middle Ages to the present (with a strong emphasis on contemporary texts). On the other hand, we will also focus on poetics and models of intertextuality and self-reference. To this purpose, we will read a number of theoretical texts that deal with questions of poetics and poetic language. Authors may include: Giorgio Agamben, Ingeborg Bachmann, Roland Barthes, Paul Celan, Jonathan Culler, Jacques Derrida, Oswald Egger, Hans-Jost Frey, Hugo Friedrich, Martin Heidegger, Friedrich Hölderlin, Roman Jakobson, Leo Spitzer, Emil Staiger, Paul Valéry, Peter Waterhouse, Ludwig Wittgenstein et al.

[GERST 4110 Literature of the Fantastic (LA-AS)]

Next offered 2011–2012. P. McBride.]

[GERST 4180 New German Literature: After the Wall (LA-AS)]

Spring. 4 credits. *Satisfies Option 1.*

Prerequisite: Any 3000-level course taught in German, or equivalent, or permission of instructor. Required readings and discussion in German. Next offered 2011–2012. L. Adelson.]

[GERST 4190 Vienna 1900 and the Challenge of Modernity]

Spring. 4 credits. *Satisfies Option 1.* Next offered 2010–2011. Taught in German. P. McBride.]

[GERST 4420 Changing Worlds: Migration, Minorities, and German Literature (LA-AS)]

4 credits. *Satisfies Option 1.* Next offered 2010–2011. L. Adelson.]

[GERST 4430 Love as Fiction. German Novellas from Three Centuries]

Spring. 4 credits. *Satisfies Option 1.* Conducted in German. Prerequisite: any course at 3000 level taught in German or equivalent or permission of instructor. Readings and discussions in German. Next offered 2010–2011. A. Schwarz.]

Courses conducted in English

GERST 3530 19th- and 20th-Century European Thought (also PHIL 2240) (KCM-AS)

Spring. 4 credits.

For description, see PHIL 2240.

GERST 3550 Political Theory and Cinema (also COML 3300, FILM 3290, GOVT 3705) (CA-AS)

Spring. 4 credits. G. Waite.

An introduction (without prerequisites) to fundamental problems of current political theory, filmmaking, and film analysis, along with their interrelationship. Particular emphasis on comparing and contrasting European and alternative cinema with Hollywood in terms of post-Marxist, psychoanalytic, postmodernist, and postcolonial types of interpretation. Filmmakers/theorists might include: David Cronenberg, Michael Curtiz, Kathryn Bigelow, Gilles Deleuze, Rainer Fassbinder, John Ford, Jean-Luc Godard, Marleen Gorris, Werner Herzog, Alfred Hitchcock, Allen and Albert Hughes, Stanley Kubrick, Fredric Jameson, Chris Marker, Pier-Paolo Pasolini, Gillo Pontecorvo, Robert Ray, Martin Scorsese, Ridley Scott, Oliver Stone, George Romero, Steven Shaviro, Kidlat Tahimik, Maurizio Viano, Slavoj Zizek. Although this is a lecture course, there will be ample time for class discussions.

[GERST 3560 Metropolis: Urban Sites in Literature]

Next offered 2010–2011. A. Schwarz.]

GERST 3600 (formerly GERST 342) Words and Music (also MUSIC 3245) # (LA-AS)

Spring. 4 credits. Prerequisite: some ability to read music. Taught in English, with reading options in English or German.

Students with no experience in reading music (playing an instrument) are encouraged to enroll concurrently in the 1-credit course MUSIC 1100. A section in German will be available for 1 extra credit (GERST 3601).

This course surveys the evolution of texts set to music in German-speaking culture of the 18th and 19th centuries. A brief presentation of Luther and the Protestant hymn will introduce sessions on texted Baroque music, especially cantatas and oratorios by Bach. After tracing the emergence of a secular culture of sensibility in Mozart's *Abduction from the Seraglio* and late 18th-century songs, readings and listening will explore Classicism and Romanticism, focusing on songs and song cycles by Beethoven, Schubert, Schumann, and Brahms. A final segment will investigate the role of words and music in constructing a German national identity, especially folk songs and Wagner's use of the past in operas such as *Tannhäuser* or *Die Meistersinger*.

[GERST 3740 Opera and Culture (also MUSIC 3222) # (LA-AS)]

Next offered 2011–2012. A. Groos.]

GERST 3770 The Art of the Historical Avant-Garde (also ARTH/VISST 3672, COML 3840, ROMS 3770) (LA-AS)

Spring. 4 credits. Prerequisite: any GERST 3000–3200-level course or equivalent. P. McBride.

At the height of modernism (1910–1930), avant-garde artists and intellectuals began arguing that art could be employed to “reconstruct the universe,” as one Futurist manifesto put it. They joined forces with the

most radical political movements of their day and created innovative artistic practices ranging from collage, montage, and the found object to the installation and the happening that continue to shape our perception of art and popular culture. This course will focus on strategies for politicizing art as well as formulating a new relation between high and popular culture in Germany, Italy, and France in the first half of the 20th century. Our investigation of avant-garde art will include original documents of Italian Futurism, Expressionism, Dada, and Surrealism.

Advanced Undergraduate and Graduate Courses

GERST 4050 Introduction to Medieval German Literature I # (LA-AS)

Fall. 4 credits. Prerequisite: reading knowledge of German. A. Groos.

After a brief introduction to basic aspects of the medieval universe, ranging from cosmology to psychology, reading will focus on introductory texts of late 12th-century courtly culture. Using the predominant genres of aristocratic self-representation, the heroic epic (*Nibelungenlied*), Arthurian romance (Hartmann's *Iwein*), and Minnesang, discussions will investigate the court as the locus of conflicting forces in the rise of the secular culture in Germany, examining such issues as the first vernacular construction of social and sexual identity, generational conflicts within the communal-dynastic order, the rise of individualism (the knightly quest), and subjectivity (the love lyric).

GERST 4060 Introduction to Medieval German Literature II # (LA-AS)

Spring. 4 credits. Prerequisite: GERST 4050 or equivalent or permission of instructor. Anchor course for the medieval period. A. Groos.

Political lyrics by Walther von der Vogelweide will introduce agendas of conflict in 13th-century German culture, ranging from crusades to civil war. Against this background, we will examine the utopian quest to win the Holy Grail and heal the Fisher King in Wolfram's *Parzival*, using Bakhtin's approach to pre-novelistic discourse. Readings from the love lyric trace representation of gender across emerging class differences, the increasing complexity of self, and instabilities of the performance text. Concluding topics may include women mystics and late medieval narratives of socio-sexual violence, anti-Semitism, and urban Angst.

GERST 4070 Teaching German as a Foreign Language

Fall. 4 credits. Intended for graduate students preparing to teach German. G. Lischke.

Designed to familiarize students with current ways of thinking in the field of applied linguistics and language pedagogy. Introduces different concepts of foreign language methodology as well as presents and discusses various techniques as they can be implemented in the foreign language classroom. Special consideration is given to topics such as planning syllabi, writing classroom tests, and evaluating students' performance. Participants conduct an action research project.

[GERST 4090 Spinoza and the New Spinozism (also COML 4090, GOVT 4769, JWST 4790) (LA-AS)]

Next offered 2011–2012. G. Waite.]

GERST 4150 Marx, Freud, Nietzsche (also COML 4250, GOVT 4735) # (CA-AS)

Fall. 4 credits. Prerequisite: none. G. Waite. This is an introduction to the three "master thinkers" who have helped determine the discourses of modernity and post-modernity. We consider basic aspects of their work: (a) specific critical and historical analyses; (b) theoretical and methodological writings; (c) programs and manifestos; and (d) styles of argumentation, documentation, and persuasion. This also entails an introduction, for non-specialists, to essential problems of political economy, continental philosophy, psychology, and literary and cultural criticism. Second, we compare the underlying assumptions and the interpretive yields of the various disciplines and practices founded by Marx, Nietzsche, and Freud: historical materialism and communism, existentialism and power-knowledge analysis, and psychoanalysis, respectively. We also consider how these three writers have been fused into a single constellation, "Marx-Nietzsche-Freud", and how they have been interpreted by others, including L. Althusser, A. Badiou, A. Camus, H. Cixous, G. Deleuze, J. Derrida, M. Foucault, H.-G. Gadamer, M. Heidegger, L. Irigaray, K. Karatani, J. Lacan, P. Ricoeur, L. Strauss, S. Zizek. This is a lecture course but there will be plenty of time for discussion.

[GERST 4200 Faust: Close Reading (LA-AS)

Fall. 4 credits. Conducted in English. Next offered 2010-2011. G. Waite.]

[GERST 4240 The Totalitarian Order: Vision and Critique (also GOVT 4255) (CA-AS)

Fall. 4 credits. Next offered 2010-2011. P. U. Hohendahl.]

[GERST 4260 The Animal (also COML 4240, ENGL 4260) (CA-AS)

Next offered 2011-2012. P. Gilgen.]

[GERST 4270 Freud and His Commentators (also HIST 4280) (HA-AS)

Next offered 2011-2012. C. Robcis.]

[GERST 4280 Genius and Madness in German Literature (LA-AS)

Next offered 2010-2011. Offered as GERST 2250 in summer 2009 to introduce students to German literature in a course surveying several centuries. Summer course will not count toward the German major requirements. A. Schwarz.]

GERST 4310 Theory of Theatre and Drama (also THETR 4310/6310) # (LA-AS)

Fall. 4 credits. H. Yan. For description, see THETR 4310/6310.

[GERST 4330 History of Modern Jewry (also HIST 4330) (HA-AS)

Fall. 4 credits. Limited to 15 students. Next offered 2011-2012. V. Caron.]

[GERST 4410 Introduction to Germanic Linguistics (also LING 4441) (HA-AS)

Next offered 2011-2012.]

GERST 4510-4520 Independent Study

4510, fall; 4520, spring. 1-4 credits each semester. Prerequisite: permission of instructor.

GERST 4530 Honors Research

Fall. Staff.

GERST 4540 Honors Thesis

Spring. 8 credits. Prerequisite: GERST 4530. Staff.

GERST 4570 Imagining the Holocaust (also COML 4830, ENGL/JWST 4580) (LA-AS)

Spring. 4 credits. D. Schwartz. For description, see ENGL 4580.

[GERST 4960 Theorizing the Public Sphere

Next offered 2010-2011. P. U. Hohendahl.]

Graduate Courses

Note: For complete descriptions of courses numbered 6000 or above consult the appropriate instructor.

[GERST 6030 Literature of Fascism and Antifascism

Fall. 4 credits. Next offered 2011-2012. P. McBride.]

GERST 6131 German Philosophical Texts (also PHIL 6030)

Fall and spring. 1-4 credits, variable. M. Kosch.

For description, see PHIL 6030.

[GERST 6140 The Man without Qualities and Theories of Narration (also COML 6141)

Spring. 4 credits. Next offered 2011-2012. P. McBride.]

GERST 6150 Jews in German Culture Since 1945

Spring. Required readings in German. Class discussion in English. L. Adelson.

Amidst widespread discussion of Holocaust memory as a "globalized" phenomenon, which becomes increasingly untethered from the historical referent, this seminar explores literature written in German since 1945, largely by Jewish authors, on the subject of Jewish life and German history. For these writers and their texts, the historical encounter with National Socialism remains pivotal to a broad range of aesthetic strategies for representing the complexity of Jewish life in West, East, and unified Germany. Readings include works by authors such as Elisabeth Langgasser, Nelly Sachs, Paul Celan, Hans Keilson, Peter Weiss, Edgar Hilsenrath, Grete Weil, Jeannette Lander, Esther Dischereit, Irene Dische, Rafael Seligmann, Maxim Biller, Barbara Honigmann, and others. This material will be considered against the larger background of postwar German attempts to represent both Jewish identity and the Holocaust. To this end the course will consider pivotal crises of representation such as those reflected in the Fassbinder scandal, the "Historians' Debate," the competition for a "German national monument to the murdered Jews of Europe," Daniel Goldhagen's reception in Germany, and recent debates about anti-Semitism. Additionally, we will consider how these literary works and cultural contexts are relevant to international cultural studies in memory, diaspora, "hybridity," and the aesthetics of representation.

[GERST 6160 Spaces of Literature

Next offered 2010-2011. A. Schwarz.]

[GERST 6180 The Science of the Experience of Consciousness: Hegel's Phenomenology of Spirit (and Beyond) (also COML 6180)

Next offered 2010-2011. P. Gilgen.]

GERST 6190 Introduction to Systems Theory (also COML 6185)

Fall. 4 credits. P. Gilgen.

Niklas Luhmann's systems theory is one of the great theoretical edifices of the last few decades. Ostensibly a sociological theory, Luhmann's work arguably has had its most disruptive, and most enduring, influence in the humanities. On the basis of his Introduction to Systems Theory, this course will provide a thorough examination of Luhmann's theoretical edifice and its theoretical building blocks, such as Talcott Parsons's systems theory, Heinz von Foerster's second-order cybernetics, George Spencer Brown's "calculus of decision," Gregory Bateson's theory of information, and Humberto Maturana's concept of autopoiesis. In addition, we will follow the development of Luhmann's own theory and analyze closely several of Luhmann's other texts, such as *Observations of Modernity*, *Ecological Communication*, *Love as Passion*, and *The Reality of the Mass Media*. (All readings will be available in English).

[GERST 6200 Faust: Close Reading (also GERST 4200)

Fall. 4 credits. Limited to 15 students. Next offered 2010-2011. G. Waite.]

[GERST 6220 Cultural Pessimism and the Fin-de-Siècle

Next offered 2010-2011. P. McBride.]

[GERST 6270 Baroque

Fall. 4 credits. Anchor course. Conducted in English. Next offered 2010-2011. G. Waite.]

[GERST 6290 The Enlightenment

Spring. 4 credits. Anchor course. Next offered 2011-2012. P. U. Hohendahl.]

GERST 6310-6320 Reading Academic German I and II

6310, fall; 6320, spring. 3 credits each semester. Prerequisites: graduate standing; for GERST 6320, GERST 6310 or equivalent. Staff.

Intended primarily for beginners with little or no previous German knowledge. Emphasis in 6310 on acquiring basic German reading skills. Emphasis in 6320 on development of the specialized vocabulary of student's field of study.

GERST 6340 German Romanticism

Spring. 4 credits. G. Waite.

Most readings in German (though some translations exist); discussion and papers in English. This is a German Department anchor course, but students from other disciplines are welcome. This graduate seminar introduces major topics and texts in literature, art, criticism, political thought, and philosophy from ca. 1789 to 1830 in two basic contexts: Europe between two revolutions-in the aftermath of Enlightenment-and in subsequent critical theory. This legacy includes Marxists and philologists (on "the flight from reality" and "the German ideology"), Freud (on "the uncanny" in Hoffmann), Balibar (on "the internal border" in Fichte), Heidegger (on "the other beginning" in H_rlin and "the essence of human freedom" in Schelling), Adorno (on "parataxis" in H_rlin), De Man (on "the rhetoric of romanticism"), Lacoue-Labarthe and Nancy (on "the literary absolute," following W. Benjamin), "the absorption of the subject" (applying M. Fried to the paintings of Caspar David Friedrich), and Deleuze & Guattari (on "the war machine" in Kleist). Of

particular interest is “the crisis of reproduction” (Althusser), involving both sexuality and social class, which entails the theme of “incest” in several forms. The primary focus will be on the close reading of texts.

[GERST 6370 19th-Century Fiction: The Realist Project]

Spring. 4 credits. Anchor course. Next offered 2010–2011. A. Schwarz.]

[GERST 6380 Readings of Recollection (also COML 6010)]

Fall. 4 credits. Next offered 2010–2011. P. Gilgen.]

[GERST 6390 Walter Benjamin: Constellations of Thought]

Spring. 4 credits. Texts in English and German. Discussions in English. Next offered 2011–2012. A. Schwarz.]

GERST 6420 Operatic States: Imagining Community in Music-drama (also MUSIC 7223)

Fall. 4 credits. A. Groos.
For description, See MUSIC 7223.

[GERST 6470 German Literature from 1949 to 1989]

Next offered 2011–2012. L. Adelson.]

GERST 6480 Critical Theory and Literature: Lukács, Benjamin, Adorno

Spring. 4 credits. P. U. Hohendahl.
In recent years the literary criticism of Lukács, Benjamin, and Adorno has received renewed attention, but in many instances this interest has remained abstract and without regard for the literary works that were the basis for their theoretical reflections. Instead, the seminar will focus on their contributions to literary criticism and literary theory in the context of modern literary history. The seminar will examine the aesthetic and methodological questions raised in Critical Theory by looking equally at the literary works and the interpretations offered by the Lukács, Benjamin, and Adorno. Special attention will be given to the period of German Classicism and European Modernism. Among the literary authors to be examined will be Goethe, George, Kafka, Brecht, Proust, and Beckett.

GERST 6500 The Culture of Weimar Germany

Fall. 4 credits. P. McBride.
This survey course is an introduction to the major developments in the culture of Weimar Germany. Individual works will be drawn primarily from literature and the visual arts and will be studied in relation to relevant cultural, political, and social contexts. Lectures and discussions will focus both on detailed interpretation of individual texts as well as on the general historical background and developments of the period.

[GERST 6530 Opera]

Next offered 2011–2012. A. Groos.]

[GERST 6560 Aesthetic Theory: The End of Art (also COML 6560)]

Spring. 4 credits. Next offered 2010–2011. P. Gilgen.]

[GERST 6580 Old High German, Old Saxon (also LING 6646)]

Spring. 4 credits. Next offered 2010–2011. W. Harbert.]

[GERST 6600 Visual Ideology]

Fall. 4 credits. Next offered 2010–2011. G. Waite.]

[GERST 6620 Reassembling Culture: Montage and Collage in Weimar Germany]

Spring. 4 credits. Next offered 2011–2012. P. McBride.]

[GERST 6630 Nietzsche and Heidegger]

Fall. 4 credits. Next offered 2010–2011. G. Waite.]

GERST 6650 Heidegger's Literature (also COML 6235)

Fall. 4 credits. A. Schwarz.
Compared to other philosophers Heidegger very rarely mentions literary authors in his works. When he does, however, attention needs to be paid to the reasons for his specific choices. Of course, Heidegger also devotes entire essays to particular authors and literary works, but those are also singular and beg the question why certain authors and works enter Heidegger's thought and others not. In this seminar we shall analyze the relationship between Heidegger's philosophical project and his examinations of literary works. Guiding questions for the seminar will be: What is the status of a literary or poetic text in Heidegger's conceptualizations of language? Do literary texts serve as mere examples for philosophy or do they write their own philosophies? What is the status of “named” works of art in Heidegger's thought? We shall also discuss Heidegger's relationship to pre-Romantic and Romantic philosophies of language (Herder, Hamann, Humboldt, Schelling). Other authors under study will include: Goethe, Schiller, Stifter, Rilke, Trakl, Nietzsche, George, Sophocles, Hoelderlin et al. Secondary texts will be compiled in a reader. Primary texts will be available in both German and English. Seminar will be held in English.

[GERST 6680 Literature and the Uncanny]

Next offered 2011–2012. A. Schwarz.]

[GERST 6710 Postcolonial Theory and German Studies]

Next offered 2011–2012. L. Adelson.]

GERST 6860 Althusser and Lacan (also COML 6860, GOVT 6795, FREN 6230)

Fall. 4 credits. Reading knowledge of French not required. G. Waite.
This seminar takes up the old “dialogue” or “confrontation” between Marxism and psychoanalysis as it continues in our “postmodern” or “post-communist” era, based on close readings of selected works by Louis Althusser and by Jacques Lacan. Specific topics include: the significance of their personal relationship; the role of “anti-philosophical” Lacanian concepts in Althusser's philosophy or “aleatory materialism”; writers of common interest (from Spinoza to Freud); the homology between the “return to Marx” and the “return to Freud”; their modes of interpretation and argumentation; the technique of “symptomatic reading”; differing concepts of “structure,” “overdetermination,” and “contradiction”; the question whether “ideology is (the) unconscious”; and their critiques of Marxism, Stalinism, and capitalism. Other writers include: Badiou, Balibar, Butler, Copjec, Freud, Gramsci, Machiavelli, Marx, Mao, Negri, Spinoza, Zizek.

[GERST 6890 The Aesthetic Theory of Adorno]

Fall. 4 credits. Next offered 2011–2012. P. U. Hohendahl.]

[GERST 6960 Rites of Contact: Emergent German Literatures and Critical Method]

Spring. 4 credits. Next offered 2011–2012. L. Adelson.]

GERST 7530–7540 Tutorial in German Literature

7530, fall; 7540, spring. 1–4 credits each semester. Prerequisite: permission of instructor.

Dutch

DUTCH 1210–1220 Elementary/Continuing Dutch

1210 (elementary), fall; 1220 (continuing), spring. 4 credits each semester. Prerequisite: permission of instructor. C. Hosea.

Intensive practice in listening, speaking, reading, and writing basic Dutch in meaningful contexts. The course also offers insight into Dutch language, culture, and society.

DUTCH 2030 Intermediate Dutch

Fall. 3 credits. *Satisfies Option 1.* Prerequisite: DUTCH 1220 or permission of instructor. Offered in Dutch. C. Hosea.

Improved control of Dutch grammatical structures and vocabulary through guided conversation, discussions, compositions, reading, and film, drawing on all Dutch-speaking cultures.

DUTCH 3000 Directed Studies

Spring. 1–4 credits, variable. Prerequisite: permission of instructor. Conducted in Dutch. C. Hosea.

Individualized advanced Dutch studies. Provides students with individualized programs which can be anything from advanced mastery in any or all skills to the mastery of Dutch for research, literature, and history in support of all disciplines.

Swedish

SWED 1210 Elementary Swedish

Fall. 4 credits. C. Alm.
Participants gain fundamental Swedish language proficiency and functional communication skills, as well as cultural insights into Sweden and its Nordic context. Oral and written expression and skills in listening and reading are developed in an interactive immersion classroom, enriched by a textbook, additive multimedia and textual materials, as well as practical activities using web tools. Brief podcasts introduce issues of current interest, and participants explore Swedish or Scandinavian language, culture, and society in guided portfolios. Intended for students without prior experience in Swedish.

SWED 1220 Continuing Swedish

Spring 4 credits. Prerequisite: SWED 1210 or equivalent Swedish language background. C. Alm.

Participants expand their proficiency in speaking, listening to, reading, and writing Swedish by working with online resources, texts, media, and cinema. The first part of the course is dedicated to topics such as leisure activities, education, government, community, seasonal festivities, and traditions. During the second half of the course, participants read and converse about level-appropriate fiction and engage with complementary materials. Particular attention is paid to functional oral and written communication, enrichment of language structures, and vocabulary (including

developing an understanding of connotative meaning dimensions), and mastering authentic Swedish materials at the adequate proficiency level. The course continues to explore the culture and societal conditions of Swedish-speaking settings, while discovering the Swedish-American experience. All instruction is in Swedish.

SWED 2030 Intermediate Swedish

Fall. 3 credits. *Satisfies Option 1.*

Prerequisite: SWED 1220 or equivalent Swedish language background. C. Alm. By studying the Swedish language alongside cultural and societal content, participants further enhance their skills of the forms and functions of Swedish at the intermediate level, while enriching stylistic and expressive variation in their use of Swedish and strengthening their understanding of Sweden and its Nordic context. Topics of exploration and discussion may include Norse mythology, the Swedish popular music industry, history of the Scandinavian languages, corporate practices in Swedish-speaking contexts, contemporary diversification of Sweden, and Swedish design. An interactive classroom that fully immerses participants in the Swedish language is combined with reading a novel, media, film, music, selections from factual and literary texts (including Norwegian and Danish samples in original version), web activities, and virtual fieldwork. Participants are given opportunities to develop specialized interests in language and culture creatively in an online collaborative writing project and in guided portfolios.

SWED 2050 Vikings, Sex, and IKEA—Scandinavian Society and Culture (CA-AS)

Spring. 3 credits. C. Alm.

In this course, which is taught entirely in English, students develop an insider perspective on the Scandinavian region of Northern Europe. Departing from core sociocultural themes such as sexuality, migration, creative expression and art, environment, as well as science/technology and entrepreneurship etc., we will dig deeply, cross-temporally, and analytically into myths and realities shaping the historical legacy and current character of Scandinavia. Participants are expected to engage in interactive critical discussions on a variety of specific sociocultural topics. For instance, we will contrast the discoveries, mythology, and diasporas of the Viking Age with 21st-century pop-culture appropriation of the Viking image. As another example, we will examine Scandinavia's progressive stance to sexuality, body, and gender within the ongoing flux of the Nordic welfare state model. As a third illustration, we will explore cartoon controversies, and contrast intra-Scandinavian approaches to multicultural diversity. A part of the course will be dedicated to detailed case studies, for example how IKEA and NOKIA became international superbrands; the conflictive juxtaposition of Nobel's invention of the dynamite and his Nobel Prize; Scandinavian perspectives on banking crises; and how Sweden intends to end its dependency on oil by 2020 while Iceland is harnessing its volcanic power. All materials for course discussion are in English, available online, and include for example visual and aural media, artistic and cinematic representations, Web 2.0 resources, written case studies, literary and academic texts, as well as hot-off-the-press news items.

SWED 3000 Directed Studies

Fall. 1-4 credits, variable. Prerequisite: permission of instructor. Times TBA with instructor. C. Alm.

Directed study of Swedish (or Scandinavian) topics that address particular student needs in relation to their field of studies. Topics might include, but are not limited to, extending Swedish language skills, studying translation or linguistic aspects of the Swedish speech community, cinematic/literary themes or directors/authors, historical developments, or particular technological, entrepreneurial, or social issues. Interested students are encouraged to contact the instructor to determine a directed plan of study.

GOVERNMENT

M. Evangelista, chair; R. Bensel, assoc. chair; C. Way, director of graduate studies; I. Kramnick, director of undergraduate studies; C. Anderson, S. Buck-Morss, V. Bunce, A. Carlson, P. Enns, J. Frank, R. Herring, M. Jones-Correa, M. Katzenstein, P. Katzenstein, J. Kirshner, S. Kreps, T. J. Lowi, S. Martin, A. Mertha, S. Mettler, K. Morrison, Y. Orlov, D. Patel, T. Pepinsky, K. Roberts, D. Rubenstein, E. Sanders, M. Shefter, A. M. Smith, S. G. Tarrow, N. T. Uphoff, N. van de Walle, J. Weeks, T. Zittel.

Web site: falcon.arts.cornell.edu/Govt

"Government" is what Cornell calls a department that elsewhere might be termed political science. The focus of this discipline is power applied to public purposes. Some faculty concentrate on purposes, some on applications. Some engage in the close reading of great texts of political philosophy, while others analyze the behavior of power-wielders and publics in this and other societies. Government is divided into four subfields: U.S. politics, comparative politics (other nations), political theory (philosophy), and international relations (transactions between nations).

The Major

To be admitted to the major, a student must pass two Cornell government courses.

To complete the major, a student must:

1. pass two of the introductory government courses (GOVT 1111, 1313, 1615, 1817);
2. pass an additional course in one of the remaining subfields (American government, comparative government, political theory, or international relations). This course may be any course offered in the government department, including introductory courses, upper-level courses or seminars but must be a minimum of 3 credits. Students are strongly advised to take at least one course in each of the four subfields;
3. accumulate an additional 28 credits of government course work at the 3000 level or above;
4. complete at least one seminar-style course in government that may be applied toward the 28 credits. These courses include those numbered 4000.XX to which students are admitted by application only; or other 4000-level GOVT courses in which no more than 15 students are enrolled.

5. accumulate 11 credits in upper-level courses in related fields (e.g., anthropology, economics, history, science and technology studies, psychology, and sociology). Upper-level courses are usually courses numbered at the 3000 level or above (2000-level courses are not considered upper-level). Students should consult with their major advisor to choose appropriate courses. All choices of related courses must be approved by the major advisor or the director of undergraduate studies;
6. all courses used to fulfill a government major must be passed with a letter grade. No S-U grades accepted.

To summarize, a total of 10 government courses and three additional courses (11 credits) of upper-level related courses are required to complete the major. For more information about the government major, **please visit our web site: falcon.arts.cornell.edu/Govt.**

Cornell in Washington Program.

Government majors may apply to the Cornell in Washington program to take courses and undertake a closely supervised externship during a fall or spring semester.

European Studies Minor. Government majors may elect to group some of their required and optional courses in the area of European studies, drawing from a wide variety of courses in relevant departments. Students are invited to consult Professors P. Katzenstein and S. G. Tarrow for advice on course selection and foreign study programs.

Model European Community Simulation.

Undergraduates with an interest in the European Union, public affairs, or debating may participate in an annual European Union simulation held, on an alternating basis, in April at SUNY Brockport or in January in Brussels. The simulation provides an opportunity for participants, representing politicians from the members states, to discuss issues and resolutions of current concern to the European Union.

To prepare for the simulation, a 2-credit course is offered by the Department of Government each year (GOVT 4313 or 4323). Participation in the simulation is open only to those who register for this course. Anyone interested in participating or finding out more information should contact the Institute for European Studies at 120 Uris Hall, 255-7592.

International Relations Minor. See the description under "Special Programs and Interdisciplinary Studies."

Honors. Application to the honors program is made in the early spring of the second semester of a student's junior year. For more information about the honors program and an application form, **please visit falcon.arts.cornell.edu/Govt.**

First-Year Writing Seminars. Consult the John S. Knight Institute brochure for times, instructors, and descriptions.

Major Seminars. Fall or spring. 4 credits. These seminars, emphasizing important controversies in the discipline, cap the majors' experience. Thus preference in admission is given to majors over nonmajors and seniors over juniors. Topics and instructors change each semester. For more information, please visit "Guide to the Undergraduate Major in Government" on falcon.arts.cornell.edu/GOV/ugrad_brochure.html#seminars.

Course Subfields. Courses in the Department of Government are broken down into four subfields: American government, political theory, international relations, and comparative government. To determine in which category (or subfield) the following courses fall, please note the two-letter reference at the end of the descriptions. The key is as follows: AM = American, PT = theory, IR = international relations, and CO = comparative.

GOVT 1111 Introduction to American Government and Politics (SBA-AS)

Fall and summer. 3 credits. T. Lowi. Introduction to government through the American experience. Concentrates on analysis of the institutions of government and politics as mechanisms of social control. (AM)

GOVT 1313 Introduction to Comparative Government and Politics (SBA-AS)

Spring and summer. 3 credits. K. Roberts. Provides a survey of the institutions, political processes, and policies of contemporary states. Focuses on the conditions for and workings of democracy. Looking at Western Europe, students analyze institutional variations among liberal democracies, and their political implications. Then they probe the origins of democracy in Western societies and the reasons why communism and other forms of authoritarian rule have prevailed elsewhere. Finally, they explore the impetus behind and the obstacles to democratization in the Third World and the erstwhile Communist Bloc. Throughout this survey, problems of democracy are related to problems of economic development, efficiency, and equality. (CO)

GOVT 1615 Introduction to Political Philosophy # (HA-AS)

Spring, winter, and summer. 3 credits. I. Kramnick. Survey of the development of Western political theory from Plato to the present. Readings from the works of the major theorists. Examination of the relevance of their ideas to contemporary politics. (PT)

GOVT 1817 Introduction to International Relations (SBA-AS)

Fall and summer. 3 credits. J. Kirshner. Introduction to the basic concepts and practice of international politics. (IR)

GOVT 1827 WIM Section: Introduction to International Relations

Fall. 1 credit. Prerequisite: permission of instructor; GOVT 1817. Staff. Special, writing-intensive section of GOVT 1817, designed to provide a small number of students the opportunity to practice and improve their writing skills as they learn about world politics. Students complete a series of papers and are expected to take an active part in class discussion. (IR)

[GOVT 2225 Controversies About Equality (also DSOC/ILROB/PAM/SOC 2220, PHIL 1905) (SBA-AS)

Spring. 4 credits. Next offered 2010–2011. S. Morgan. For description, see SOC 2220.]

GOVT 2403 China Under Revolution and Reform (also CAPS 2403) @ (SBA-AS)

Fall. 3 credits. A. Mertha. This course provides a broad overview of the evolution of Chinese politics from the early part of the 20th century to the present. It is roughly divided into three sections. The first traces the formation and the progression of

modern state and party institutions following the collapse of the Qing Dynasty in 1911, through the communist rise to power and into the Mao era (1949–1976), culminating in the period of “opening up and reform” (1978–present). The second part of the course examines China’s institutional apparatus, focusing on mapping out the government, Party, and military bureaucracies; examining relations between Beijing and the localities; and on the institutionalization of these structures and processes over time. The third part of the course combines the insights of the course thus far to illuminate some of the current “hot button” issues facing the Chinese state and the world, combining politics and policy and examining the relationships between the two. No prior knowledge of China is required or expected.

GOVT 2605 Social and Political Philosophy (also PHIL 2420) (KCM-AS)

Spring. 4 credits. E. Taylor. For description, see PHIL 2420.

[GOVT 2626 French Thought After May '68 (also COML/HIST 2331) (HA-AS)

Spring. 4 credits. Next offered 2010–2011. C. Robcis.]

[GOVT 2716 Politics of Violence in 20th-Century Europe (also HIST 2711) (HA-AS)

Spring. 4 credits. Next offered 2010–2011. H. Case.]

GOVT 2729 Origins of the Social (HIST 2330) (HA-AS)

Spring. 4 credits. C. Robcis. For description, see HIST 2330.

GOVT 2747 History of Modern Middle East in 19–20th Century (also HIST/JWST/NES 2674) # @ (HA-AS)

Fall. 3 credits. Z. Fahmy. For description, see NES 2674.

GOVT 2827 China and the World (also CAPS 2827) @ (CA-AS)

Spring. 3 credits. A. Carlson. Study of the dramatic rise of China through reviewing major developments in contemporary Chinese foreign policy since the establishment of the People’s Republic of China (PRC), and concentrating more specifically on major developments in Chinese foreign policy during the 1980s and 1990s. Such a wide-ranging survey of Chinese foreign policy involves not only a consideration of the evolution of China’s relations with its major bilateral partners but also an investigation of how China has defined its broader relationship with the international system. In addition, students are asked to consider which causal factors have been of primary importance in motivating Chinese behavior. (IR)

[GOVT 3021 Social Movements in American Politics (also AMST 3021) (HA-AS)

Spring. 4 credits. Next offered 2010–2011. E. Sanders. Analyzing movements from the 19th century to the present, we examine the conditions that gave rise to the movements, their accomplishments, and their political legacies. (AM)

[GOVT 3031 Imagining America (also AMST 3031) (CA-AS)

Fall. 4 credits. Next offered 2011–2012. D. Rubenstein.]

[GOVT 3043 Sex, Power, and Politics (also FGSS 3040) (SBA-AS)

Spring. 4 credits. Next offered 2010–2011. S. Martin.]

GOVT 3063 Society and Party Politics (also SOC 3070) (SBA-AS)

Spring. 4 credits. S. Van Morgan. For description, see SOC 3070.

GOVT 3071 Introduction to Public Policy (SBA-AS)

Summer. 4 credits. Offered in Cornell in Washington Program. S. Jackson. Public policy is shaped by many forces. This course will enhance your ability to understand those forces and the policies that they produce. It will provide you with tools for thinking about, assessing, and evaluating those policies. And it will introduce you to the substantive core of several major issues in America today. The course will have three segments. In the first, we will examine the relevant institutions, interests, and ideologies which operate in the policy arena and the debates about the impact of these forces which engage students of the policy process. In the second, we will consider two different lenses through which we might peer to evaluate policies. In the third, we will discuss the main lines of debate in contemporary American politics concerning four substantive issues: crime and punishment, education, the economy and foreign trade, and foreign policy. The course will meet four days a week for one hour. Based on assigned readings, the class sessions will mix lectures, discussions, group activities, and guest speakers.

[GOVT 3091 Science in the American Polity (also AMST/STS 3911) (SBA-AS)

Spring. 4 credits. Next offered 2011–2012. J. Reppy. For description, see STS 3911.]

[GOVT 3111 Urban Politics (also AMST 3111) (SBA-AS)

Fall. 4 credits. Next offered 2011–2012. M. Shefter.]

GOVT 3128 America’s Changing Faces (also AMST 3128)

Summer. 2 credits. Offered in Cornell in Washington Summer Program. S. Jackson. A new generation of leaders has emerged in America’s political, economic, educational and cultural institutions. Those leaders employ and explore in their work modern communications technologies such as the Internet. Thereby, they are changing both what is done, and how things are done in the respective life spheres. This course explores the resulting changes in the nature of American life and asks questions about the interactions among the different realms of life. (AM)

GOVT 3131 The Nature, Functions, and Limits of Law (also LAW 4131) (CA-AS)

Fall. 4 credits. Prerequisite: undergraduate standing. A. Riles. For description, see LAW 4131.

[GOVT 3141 Prisons (also AMST 3141) (SBA-AS)

Fall, winter, and summer. 4 credits. Next offered 2010–2011. M. Katzenstein.]

GOVT 3150 The American Legal System: Its Nature, Functions, and Institutions

Summer. 4 credits. Offered in New York City. C. Stewart.

For description, see Summer Session link www.sce.cornell.edu.

GOVT 3161 The American Presidency (also AMST 3161) (SBA-AS)

Fall. 4 credits. E. Sanders.

This course will explore and seek explanations for the performance of the 20th- to 21st-century presidency, focusing on its institutional and political development, recruitment process (nominations and elections), relationships to social groups, economic forces, and "political time", and foreign and domestic policy-making.

GOVT 3171 Campaigns and Elections (also AMST 3171) (SBA-AS)

Fall. 4 credits. Prerequisite: GOVT 1111 or permission of instructor. Next offered 2011-2012. P. Enns.

This course examines campaigns and elections, focusing primarily on national elections in the United States. Topics typically include campaign finance, negative campaigning, the noncompetitiveness of congressional elections, presidential elections, why there are almost but not quite three parties, voter turnout, individual voting decisions, how the votes are counted (or not), and elections and the economy. We examine several theories that may explain some of these phenomena, including in particular theories of rational choice. Course requirements usually include two papers with one being based on original analysis of election survey data.

[GOVT 3181 U.S. Congress (also AMST 3181) (SBA-AS)]

Spring. 4 credits. Next offered 2010-2011. M. Shefter.

The role of Congress in the American political system. Topics include: the political setting within which Congress operates, the structure of Congress, the salient features of the legislative process, and recent congressional behavior in a number of policy areas. (AM)

[GOVT 3191 Racial and Ethnic Politics (also AMST/LSP 3191) (SBA-AS)]

Spring. 4 credits. Next offered 2010-2011. M. Jones-Correa.]

[GOVT 3212 Public Opinion and Representation (SBA-AS)]

Spring. 4 credits. Next offered 2011-2012. P. Enns.

This course will examine the nature of public opinion and analyze when and how it influences government. Specifically, the class will study various definitions of public opinion, theories of opinion formation and change, and how public opinion influences government policy. We will also analyze public attitudes toward specific issues, such as race and welfare, and we will discuss normative questions, such as the role opinion should play in American democracy.]

[GOVT 3241 Inequality and American Democracy (also AMST 3241) (SBA-AS)]

Fall. 4 credits. Next offered 2010-2011. S. Mettler.

Can democratic governance survive amid high economic inequality? We investigate effect across three major aspects of the American political system: voice, governance, and public policy.]

GOVT 3293 Comparative Politics of Latin America (also DSOC/LATA 3290) @ (SBA-AS)

Spring. 4 credits. Knowledge of Spanish or Portuguese not required. G. Flores-Macias.

This course is designed as an introduction to political, economic, and social issues in 20th-century Latin America. In the first section of the course the regions is analyzed through a political lens, focusing on issues including state formation, populism and corporatism, revolutions, the breakdown of democracy, military rule, and democratization. We then turn to issues under the heading of economic perspectives including dependency theory, import-substitution industrialization, the debt crisis, market reform, and the period of the post-Washington Consensus. The third section of the course presents a selection of the region's central social issues including class structures, civil-military relations, church-state relations, social movements, and both internal and international migration. Throughout the semester, we will make reference to specific countries to illustrate each topic.

[GOVT 3303 Politics of the Global North (also ILRIC 4330)]

Fall and summer. 4 credits. Next offered 2010-2011. L. Turner.

For description, see ILRIC 4330. (CO)]

GOVT 3313 Middle Eastern Politics (also NES 3850) @ (CA-AS)

Spring. 4 credits. D. Patel.

This course provides an introduction to contemporary Middle Eastern politics. The goal is to provide students with historical background and theoretical tools to answer the following core questions: (1) Why do authoritarian political systems persist in the Middle East more than they do elsewhere? (2) Why have Islamist groups become prominent opposition forces in and across some countries? (3) Why do some Middle Eastern countries suffer from high levels of political violence while others are spared? (4) What accounts for the region's current economic underdevelopment? (5) Would the adoption of Western-style political institutions improve governance and stability in the region? The course explicitly compares outcomes and explanations within the region, between the region and other world areas, and over time.

[GOVT 3323 Modern European Politics (SBA-AS)]

Fall. 4 credits. Next offered 2010-2011. T. Zittel.]

GOVT 3344 Islamic Politics (also NES 3844) @ (SBA-AS)

Fall. 4 credits. D. Patel.

This course examines the relationship between politics and contemporary Islamist movements. We will investigate the following core questions: Are religion and politics inseparable in Islam? Are Islamist movements products of the modern world or reactions against it? How does "Islam" mobilize adherents? Why have Islamists become prominent opposition forces in recent decades in some countries, but not others? Why do some Islamists, but not others, espouse violence? Do Islamist movements change as they participate in pluralist political processes? The course investigates the evolution of contemporary Islamist movements in the context of anti-colonial struggles, modern nation-state formation, neo-liberal reform, and in relation to forms of political opposition under authoritarianism and democracy. We will explore cases from the

Middle East, Central Asia, South Asia, Southeast Asia, and West Africa in order to identify and account for variation in Islamic political mobilization.

GOVT 3353 African Politics

Fall. 4 credits. N. van de Walle.

This is an introductory course on the politics of Sub-Saharan Africa. The goal is to provide students with historical background and theoretical tools to understand present-day politics on the continent. The first part of the course will survey African political history, touching on: pre-colonial political structures, colonial experiences and legacies, nationalism and independence movements, post-independence optimism and state-building, the authoritarian turn, economic crises, and recent political and economic liberalizations. The second part of the course will examine some contemporary political and economic issues. These include: the effects of political and social identities in Africa (ethnicity, social ties, class, citizenship); the politics of poverty, war, and dysfunction; Africa in the international system; and current attempts to strengthen democracy and rule of law on the continent.

[GOVT 3383 Comparative Political Economy (SBA-AS)]

Spring. 4 credits. Next offered 2011-2012. C. Way.]

GOVT 3413 Modern European Society and Politics (also SOC 3410) (SBA-AS)

Fall. 4 credits. S. Van Morgan.

This survey course provides an interdisciplinary overview of European social and political issues. Themes of the course will include, but will not be limited to, the political development of the nation-state, modes of governance, welfare state restructuring, party systems and elections, social movements, immigration and demography, culture and identity, external relations, and the special challenges posed by European political and economic integration. A series of background and contextual lectures will be complemented by presentations given by leading Europeanists.

[GOVT 3427 Germany and Europe (SBA-AS)]

Fall. 4 credits. Next offered 2011-2012. T. Zittel.]

GOVT 3437 Politics of the European Union (SBA-AS)

Spring. 4 credits. T. Zittel.

Despite recent bad feelings, the countries constituting the European Union (EU) still remain the most important partners for the United States in the world. And despite the rise of China and other Asian countries, the EU, together with the United States, still calls the tune in the international economy. However, even citizens of the European Union generally know very little about how this complex structure works. This course explores the policies and policy-making of the European Union against the backdrop of the postwar history of European integration and the institutional framework of the EU. Also considers the external dimension of the EU and explore current debates about the emerging European polity, in particular the European constitution. Throughout the course students reflect on parallels with the American political system and on the state of current transatlantic relations. (IR)

GOVT 3443 Government and Politics of Southeast Asia (also ASIAN 3334) @ (HA-AS)

Spring. 4 credits. T. Pepinsky.
Southeast Asia is one of the world's most diverse and fascinating regions. This course will survey the political development of modern Southeast Asia, from the colonial period through today, focusing on Burma, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam. We will seek to understand variation across time, across countries, and within countries on topics such as economic development, state-building, democratization, corruption, ethnic relations, and civil violence.

GOVT 3463 Modern Japanese Politics (also ASIAN 3346) @ (SBA-AS)

Spring. 4 credits. S. Martin.
In the 1980s, Japan was number one. The consolidation of its postwar democracy and rapid economic growth offered an alternative political economic model for emerging democracies. By the 1990s, the economic bubble burst and provided momentum for reforming the Japanese way of doing politics. Whereas the U.S. sought to learn from Japan's success in the 1980s, we now seek to apply lessons from its failures to politically resolving our own economic crisis. This course examines the rise and fall of the "1955 System" and Japan's ongoing struggle to reach a new political equilibrium through reforms aimed at producing a better democracy. These broad themes will be addressed through a close analysis of citizen engagement with the institutional framework in an increasingly global context.

GOVT 3553 Issues Behind the News

Fall. 2 credits. Prerequisites: AEM/ECON 2300 or ANTHR 1400 or GOVT 1817 or GOVT 2947/PHIL 1940, or by permission of instructor. N. van de Walle.

This course will cover international current events as they unfold during the semester. Faculty from across the university will be invited to contextualize and deepen students' understanding of elections, wars, complex humanitarian emergencies, international agreements, global health issues and other relevant international events that are in the news. The course will respond flexibly to unforeseen events. Special attention will be devoted to U.S. foreign policy issues and how U.S. foreign policies are formulated and implemented. The course will strive to expose students to different points of view on these issues.

GOVT 3605 Ideology (CA-AS)

Fall. 4 credits. D. Rubenstein.
Focuses on critical approaches to the study of ideology in order to understand the role of ideology in political subject formation. After an initial presentation of the classical Marxist texts on ideology, examines 20th-century reworkings of hegemony theorist Antonio Gramsci and the critical structuralist approaches of Roland Barthes, Jean Baudrillard, and Dick Hebdige. Concentrates on the "lived relation" to ruling ideas in the form of ideologies of everyday life. The second part of the course is devoted to psychoanalytically oriented theories (Freud, Lacan) which address the internalization of belief, both in relation to the intrapsychic and in the interaction between psychic and state apparatuses. Concludes with Louis Althusser's notion of interpellation, which resumes the Marxist, structuralist and psychoanalytic objectives of the course material. The theorists

in the second part of the course are contextualized within the experience of the historical traumas of fascism and French decolonization. Throughout the semester, students reflect on the continued relevance of historic ideologies, centered around notions of class interest, to late 20th-century ideologies' attachments to national, religious, gendered, ethnic, technological identity. (PT)

GOVT 3625 Modern Political Philosophy (also PHIL 3460) (KCM-AS)

Fall. 4 credits. R. Miller.
For description, see PHIL 3460.

GOVT 3633 Politics and Culture (also SOC 2480) (HA-AS)

Fall. 4 credits. M. Berezin.
For description, see SOC 2480.

[GOVT 3655 Politics and Literature (also AMST 3655) (LA-AS)]

Fall. 4 credits. Next offered 2010–2011.
J. Frank.]

GOVT 3665 American Political Thought from Madison to Malcolm X (also AMST 3665, HIST 3160) # (HA-AS)

Fall. 4 credits. I. Kramnick.
Survey of American political thought from the 18th century to the present. Particular attention is devoted to the persistence of liberal individualism in the American tradition. Politicians, pamphleteers, and poets provide the reading. Insightful historical and social context is offered.

[GOVT 3695 Marx and After # (KCM-AS)]

Fall. 4 credits. Next offered 2011–2012.
S. Buck-Morss.
We will read the texts of Marx that set the agenda for a century of political and theoretical debate, and key essays that have built on his dialectical materialist theory in the 20th century.]

GOVT 3705 Political Theory and Cinema (also COML 3300, FILM 3290, GERST 3550) (CA-AS)

Spring. 4 credits. G. Waite.
For description, see GERST 3550.

[GOVT 3716 Education of Princes (also COML/NES 3716) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011.
S. Toorawa.

For description, see NES 3716.]

GOVT 3725 Ideology 2: Everyday Life (also COML/FREN 3725) @ (CA-AS)

Spring. 4 credits. D. Rubenstein.
This course elaborates a critique of everyday life in writings of 20th- and 21st-century continental authors such as Henri Lefebvre, Michel de Certeau, Pierre Bourdieu, Jean Baudrillard and Guy Debord, among others. Topics to be considered include consumerism, neoliberalism, situationism as well as larger philosophical issues relating to time, space and technology.

GOVT 3735 Political Freedom

Spring. 4 credits. J. Frank.
This course will explore dilemmas surrounding the concept and practice of political freedom. We will begin with an examination of traditional philosophical approaches to this issue—such as debates about free will and determinism, agency and structure, and negative and positive liberty—but we will primarily focus on how these traditional rubrics obscure our understanding of the particularity of political freedom. In order to better grasp this particularity we will

explore diverse theoretical, literary, and social scientific works. Authors read may include Sophocles, Augustine, Dostoevsky, Plato, Arendt, Emerson, Dewey, Foucault, Melville, Berlin, Gaventa, and Scott.

GOVT 3847 Weapons of Mass Destruction (also PHYS 2206) @

Spring. 4 credits. *Students enrolled in GOVT 3847 receive SBA-AS and students enrolled in PHYS 2206 receive PBS-AS.*

S. Kreps and G. Lewis.
The 20th and early 21st centuries have been profoundly affected by the development of extremely destructive, technology-based weapons, often (and sometimes wrongly) lumped together under the term "weapons of mass destruction." This course will examine topics such as the physics, technology, ethics, and politics of nuclear weapons. In addition, the course will explore the nuclear arms race, efforts to restrain it via arms control, important concepts and strategies including nuclear deterrence, and recent and current issues associated with nuclear proliferation. Similarly, the technology, past and future potential uses, and prospects for preventing future use of biological, chemical, and radiological weapons will be covered. Finally, the delivery systems that enable the use of many of the above weapons will also be covered, ranging from the mass and fire bombings of World War II, to the massive missile arsenals of the Cold War, and to current issues such as the deployment and effectiveness of missile defenses.

[GOVT 3857 American Foreign Policy (also CAPS 3857) (SBA-AS)]

Fall. 4 credits. Next offered 2010–2011.
P. Katzenstein.

America is marked by multiple traditions and identities as well as a state on steroids, or imperium, and a nation on stilts, or civilization. These traits are reflected in its foreign policies. (IR)

[GOVT 3867 The Causes of War (SBA-AS)]

Spring. 4 credits. Next offered 2011–2012.
C. Way.]

GOVT 3898 International Law (HA-AS)

Fall. 4 credits. Taught in Washington, D.C.
Is international law a pious delusion, helpless in the face of real power? Or is public policy becoming so entangled in international standards that international law is now eroding national sovereignty? This course surveys the theoretical foundations and general history of international law since the 17th century to highlight what is new in the doctrines and institutions by which it operates in the contemporary world. The course gives special attention to the relation between international and U.S. law and to the workings of international law in particular fields—including environmental and human rights protection, trade regulation, and control of terrorism. (IR)

GOVT 3937 Introduction to Peace and Conflict Studies (SBA-AS)

Fall and summer. 4 credits. S. Kreps.
This course serves as an introduction to the study of war, peace, and peacemaking. We will study different theories of peace and war from a variety of disciplinary perspectives. The course will cover definitions of peace and war, causes of conflict, and modes of conflict prevention and resolution. The concepts will be applied to a range of historical and current conflicts. Students will prepare analyses of specific conflicts or instances of peacemaking for class presentation. (IR)

[GOVT 3944 Comparative Foreign Policy

Spring. 4 credits. Next offered 2010-2011.
J. Weeks.

This course explores differences in foreign policy across states, introducing competing theories of foreign policy and applying them to specific countries and foreign policy issues.]

[GOVT 3957 New Forces in International Politics (SBA-AS)

Fall. 4 credits. A. Carlson.

How important are regional groupings, non-governmental organizations, narco-terrorists, ethnic groups and transnational environmental issues, within international politics? These forces seem to be occupying an increasingly central position in the international arena, yet the factors that have caused their rise, and the degree to which they have transformed the face of international politics, are still poorly understood. In this course we will address such issues through exploring how students of international politics have described and explained the emergence of these new forces in the international system during the post-Cold War period. In short, the course will focus on determining the extent to which we are witnessing a transformation of the international political system, and why such a change is (or is not) taking place.

[GOVT 3977 Israeli-Palestinian Conflict (also HIST/SOC 3970, JWST/NES 3697) @ (HA-AS)

Spring. 4 credits. R. Brann.
For description, see NES 3697.

[GOVT 4032 Immigration and Politics Research Seminar (also AMST/LSP 4032) (SBA-AS)

Spring. 4 credits. Next offered 2011-2012.
M. Jones-Correa.]

[GOVT 4041 American Political Development in the 20th Century (also AMST 4041, AMST/GOVT 6121) (HA-AS)

Fall. 4 credits. Next offered 2010-2011.
E. Sanders.

Examines major political reform periods leading to policy change in economic regulation, social welfare, and national security policy.]

[GOVT 4051 The Postmodern Presidency: Election 2008 (also AMST 4051) (CA-AS)

Fall. 4 credits. D. Rubenstein.]

[GOVT 4061 Politics of Slow-Moving Crisis (also AMST 4061/6161, GOVT 6161) (SBA-AS)

Fall. 4 credits. Next offered 2011-2012.
M. Jones-Correa.]

[GOVT 4142 Causes and Consequences of American Foreign Policy (also AMST 4142, GOVT/AMST 6142) (SBA-AS)

Fall. 4 credits. Next offered 2011-2012.
E. Sanders.

What is the impact of U.S. foreign policy on the world, U.S. society, and political institutions? What are the forces that drive U.S. foreign policy?]

[GOVT 4222 Political Culture (also AMST 4222)

Spring. 4 credits. R. Benschel.
This course will explore the relationship between popular belief, political action, and the institutional deployment of social power. The class will be roughly divided in three parts, opening with a discussion of how the material

world influences the culture of a society. The middle section will connect culture to political ideology, including symbolism and the construction of group identity. The last part of the course will consider ways in which cultural symbols and ideology can be manipulated in order to legitimate government authority. We will then, coming full circle, trace how political regimes can influence the social practices from which culture originates.

[GOVT 4231 The 1960s: Conceptualizing the Future from the Past (also AMST 4231) (CA-AS)

Fall. 4 credits. Next offered 2010-2011.
J. Kirshner and T. Lowi.]

[GOVT 4241 Contemporary American Politics (also AMST 4241, AMST/GOVT 6291) (HA-AS)

Spring. 4 credits. M. Shefter.
Seminar analyzing some major changes in U.S. electoral and group politics in recent decades. Topics include: partisan realignment, the new conservatism, racial cleavages, "identity politics," and democratic decline.

[GOVT 4281 Government and Public Policy: An Introduction to Analysis and Criticism (also AMST 4281/6281, GOVT 7281) (SBA-AS)

Fall. 4 credits. T. J. Lowi.
Concentrates on history and criticism of U.S. policies and the politics associated with them. Particular attention is given to the origins and character of the regulatory state and the welfare system. (AM)

[GOVT 4293 Politics of Science (also STS/BSOC 4291) (SBA-AS)

Fall. 4 credits. Next offered 2010-2011.
R. Herring.
A research seminar in which each student, or perhaps some in clusters, will write research papers on the politics of science. How do societies—and increasingly global regimes—deal with collective uncertainty and risk? What are the arguments about trade-offs and precaution? Science claims for itself only a method of judging truth claims through transparent and replicable testing of theory-driven hypotheses: how do theological ("creation science" or "Vedic science") and civilizational ("Western science") embeddings become politically activated? To what extent is real science politically crippled by its own commitment to incremental evidence-based knowledge in the face of junk science? We will look at scientific controversies and their political representation in the large general field of the environment, medicine, biotechnology and food systems.]

[GOVT 4374 States and Societies in the Middle East (also GOVT 6474, NES 4874/6874)

Spring. 4 credits. D. Patel.
This seminar surveys research approaches and puzzles in contemporary Middle Eastern politics. Students will be introduced to some of the major arguments, hypotheses and debates in the literature. Topics to be considered include: the nature and legacies of colonialism, state-building and the character of contemporary Middle Eastern regimes, the political economy of oil, economic crises, elections and political "liberalization," and the role of Islamism in political, social, and economic life. The seminar is designed principally for graduate students who focus their research on the Middle East and advanced undergraduates who have taken courses in Middle Eastern politics or history.

[GOVT 4585 American Political Thought (also AMST 4585, GOVT 6585) (HA-AS)

Fall. 4 credits. J. Frank.
Seminar providing an advanced survey of the history of American political thought, with emphasis placed on four significant periods: Puritan New England, the Revolution and Founding, Abolition and Civil War, and the Progressive Era. Authors read may include: Winthrop, Hutchinson, Franklin, Paine, Jefferson, Madison, Warren, Tocqueville, Fitzhugh, Calhoun, Douglas, Garrison, Thoreau, Melville, Whitman, Lincoln, Adams, Du Bois, Goldman, Dewey, Lippmann, Taylor, and Bourne. (PT)

[GOVT 4616 Interpreting Race and Racism: Du Bois (also AMST 4616) (HA-AS)

Spring. 4 credits. Next offered 2010-2011.
A. M. Smith.
Seminar in critical race theory and the contemporary implications of the Reconstruction Amendments to the Constitution, with a focus on the work of Du Bois.]

[GOVT 4625 Sexuality and the Law (also AMST 4625/6625, FGSS 4610/7620, GOVT 7625) (KCM-AS)

Spring. 4 credits. Next offered 2011-2012.
A. M. Smith.]

[GOVT 4635 Feminist Theory/Law and Society (also AMST 4365) (CA-AS)

Fall. 4 credits. Next offered 2010-2011.
A. M. Smith.
Feminist analysis of policy and legal issues central to gender justice: reproductive rights, HIV and AIDS, poverty policy, transnational women's advocacy, prisons, same-sex marriage, etc. (PT)]

[GOVT 4646 Derrida and Philosophy of Hospitality (also GOVT/COML 6675, HADM 5590)

Fall. 4 credits except for HADM 5590, which is 3 credits. D. Rubenstein and L. Shaffer.
Beginning with an examination of hospitality in Plato, Xenophon, Kant, Levinas, and the Bible, we focus on the writings of Jacques Derrida on hospitality from the 1990's until his death. We also consider contemporary readers of hospitality and cosmopolitanism such as Tracy McNulty, Pierre Bourdieu, Seyla Benhabib, Bonnie Honig, James Davidson, Andrew Sandoval-Strausz, and Wayne Koestenbaum. These theoretical texts would be put in tension with practitioners such as Danny Meyers, E. M. Statler, films (Frears, Loach), novels (Kirin Desai) and labor manifestos (Ehrenreich, Levinson.)

[GOVT 4665 Islamism (also NES 4953) @

Fall. 4 credits. Prerequisite: graduate students or juniors and seniors who have taken GOVT 1615 or 3000-level course in political theory. S. Buck-Morss.
This course is intended to introduce students to the complexities of political Islam as a modern experience of opposition that deals with issues of social justice, legitimate power, and ethical life. While we will read translations of original sources by founding theorists (Sayyid Qutb, Ali Shariati, Iqbal) as well as excerpts from speeches by Islamic militants (Ayatollah Khomeini, Osama bin Laden), our approach is not only textual. We are interested in the role Islamism plays in everyday life of hundreds of thousands of contemporary Muslims, analyzed by anthropologists, literary

critics, media analysts (of cassettes, cinema, and internet) and others who describe its audio, visual, public, private, and networking effects. We will also examine recent interconnections between Islamic with Western thinkers (Malcolm X, Frantz Fanon).

GOVT 4678 Extrastatecraft (also SHUM/VISST 4826)

Fall. 4 credits. K. Easterling.
For description, see SHUM 4826.

[GOVT 4705 Contemporary Reading of the Ancients (CA-AS)]

Fall. 4 credits. Graduate students welcome to enroll. Next offered 2011–2012.
D. Rubenstein.]

[GOVT 4715 Critical Reason, The Basics: Kant, Hegel, Marx, Adorno (also GERST 4710) (KCM-AS)]

Fall. 4 credits. Next offered 2010–2011.
S. Buck-Morss.]

GOVT 4735 Marx, Freud, Nietzsche (also COML 4250, GERST 4150) # (CA-AS)]

Fall. 4 credits. G. Waite.
For description, see GERST 4150.

GOVT 4748 Link, Network, Nexus (also COML 4115, FREN/SHUM 4936, STS 4361)

Spring. 4 credits. B. Massumi.
For description, see SHUM 4936.

[GOVT 4769 Spinoza and the New Spinozism (also COML/GERST 4090, JWST 4790) (LA-AS)]

Fall. 4 credits. Next offered 2011–2012.
G. Waite.]

[GOVT 4809 Politics of '70s Films (SBA-AS)]

Spring. 4 credits. Next offered 2011–2012.
J. Kirshner.]

GOVT 4817 International Conflict and Laws of War (SBA-AS)]

Spring. 4 credits. S. Kreps.
The purpose of this course is to explore contemporary international law as it addresses the use of military force. It first explores *ius ad bellum*—the law relating to the recourse to force, including its historical development, the UN Charter framework for the use of force, and a number of current issues relating to the *ius ad bellum*. These will include: preemptive force, rescue of nationals, humanitarian intervention, civil conflict, and terrorism. The course then turns to an examination of *ius in bello*—the law relating to the conduct of hostilities. It evaluates the legal framework established by the Hague and Geneva Conventions and discusses a variety of contemporary issues, including the treatment of prisoners of war, the use of nuclear weapons and other weapons of mass destruction, and weapons targeting policies. Third, the course examines courts and other tribunals that have been established to try persons for violation of international legal rules dealing with the use of force. Such tribunals include: the Nuremberg Tribunal, the International Criminal Tribunals for Yugoslavia and Rwanda, and the International Criminal Court. Finally, we will explore the future of the law relating to the use of force. (IR)

GOVT 4827 Unifying While Integrating: China and the World (also CAPS 4827, GOVT 6827) @ (HA-AS)]

Spring. 4 credits. A. Carlson.
Seminar intended to examine the increasingly complex relationship that has evolved

between China and the rest of the international system during the 1980s and 1990s. Emphasizes the interrelated, yet often contradictory, challenges facing Beijing in regard to the task of furthering the cause of national unity while promoting policies of integration with international society and interdependence with the global economy. Concentrates especially on ongoing controversies over the rise of Chinese nationalism and the persistence of “minority nationalism” in many regions within China. (IR)

[GOVT 4837 The Military and New Technology (also STS 4831) (SBA-AS)]

Fall. 4 credits. Next offered 2011–2012.
Staff.
For description, see STS 4831.]

[GOVT 4862 Classics and Early America (also CLASS 4683, HIST 4861) # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011.
H. Rawlings.
For description, see CLASS 4683.]

GOVT 4877 Asian Security (also CAPS 4870, GOVT 6877) @ (SBA-AS)]

Fall. 4 credits. A. Carlson.
Throughout the 1990s it has been part of the conventional wisdom of international relations scholarship that Asia was, in the words of Aaron Friedberg, “ripe for rivalry.” In this seminar we explore the accuracy of such an assessment through studying Asia’s historical and contemporary security situation. Such an examination will be oriented toward introducing students to the main security issues confronting Asia, alongside an exploration of the extent to which competing explanations drawn from different strands of IR theory and the security field can explain such issues. In addition, we will ask students to challenge the limitations of traditional security studies through considering the importance of new actors and issue areas within the region. In short, while the Seminar will have a regional focus on East Asia, it will be framed within the broader literature of the field.

[GOVT 4917 Ethics in International Relations (KCM-AS)]

Spring. 4 credits. Next offered 2011–2012.
M. Evangelista.

This course examines current and historical issues in international relations from the perspective of international law, norms, and ethics.]

GOVT 4949 Honors Seminar: Thesis Clarification and Research

Fall. 4 credits. Prerequisite: acceptance into honors program. E. Sanders.
Designed to support thesis writers in the honors program during the early stages of their research projects.

GOVT 4959 Honors Thesis: Research and Writing

Spring. 4 credits. Prerequisite: successful completion of GOVT 4949. E. Sanders.

GOVT 4998 Politics and Policy: Theory, Research, and Practice (also ALS/AMST/CAPS 4998, PAM 4060)

Fall, spring. Offered in Cornell in Washington Program.
This required course forms the core of the Cornell in Washington program for students in the public policy option. The central course objective is to provide students with the

instruction and guidance necessary to analyze and evaluate their own chosen issue in public policy. Toward that end, the course has three components: (1) weekly lectures providing background on the structures and processes of national politics and policy as well as training in research methodology; (2) student externships; and (3) individual research papers or projects. All three components interrelate so as to provide students with a strategy and framework for integrating classroom based learning, field experience and individual research.

GOVT 4999 Undergraduate Independent Study

Fall or spring. 1–4 credits.
One-on-one tutorial arranged by the student with a faculty member of his or her choosing. Open to government majors doing superior work, and it is the responsibility of the student to establish the research proposal and to find a faculty sponsor. Applicants for independent study must present a well-defined program of study that cannot be satisfied by pursuing courses in the regularly scheduled curriculum. No more than four credits of independent study may count toward fulfillment of the major. Students who elect to continue taking this course for more than one semester must select a new theme or subject each semester. Credit can be given only for work that results in a satisfactory amount of writing. Emphasis is on the capacity to subject a body of related readings to analysis and criticism. Keep in mind that independent study cannot be used to fulfill the seminar requirement. The application form for independent study is available in 210 White Hall and must be completed at the beginning of the semester in which the course is being taken.

[GOVT 6019 Methods of Political Analysis I]

Fall. 4 credits. Next offered 2011–2012.
P. Enns.

Introduction to the quantitative analysis of political data, with an emphasis on probability theory, descriptive statistics, measures of association, and hypothesis testing.]

GOVT 6029 Methods of Political Analysis II

Spring. 4 credits. P. Enns.
This course will introduce students to some basic methods for conducting quantitative analyses in political science. After taking this course, students will be able to read and critique political science research that uses basic statistical analyses as well as be able to use basic statistical techniques, such as multiple regression analysis, in their own research. The course will begin with basic probability theory and proceed to statistical analysis of political data.

[GOVT 6031 Field Seminar in American Politics]

Fall. 4 credits. Next offered 2011–2012.
M. Jones-Correa.

Introduces the major issues, approaches, and institutions of American government and the various subfields of American politics. Focuses on both substantive information and theoretical analysis. (AM)]

GOVT 6053 Comparative Method in International and Comparative Politics

Spring. 4 credits. C. Anderson.

An in-depth, graduate-level introduction to qualitative and comparative methods of political analysis, with special emphasis on the application of these methods in comparative and international politics. Through readings, discussions, and written assignments, students will explore strategies for concept formation, theory construction, and theory testing, using the craft and tools of comparative political analysis.

GOVT 6067 Field Seminar in International Relations

Fall. 4 credits. S. Kreps.

General survey of the literature and propositions of the international relations field. Criteria are developed for judging theoretical propositions and are applied to the major findings. Participants are expected to do extensive reading in the literature as well as research. (IR)

GOVT 6075 Field Seminar in Political Thought

Spring. 4 credits. I. Kramnick.

A survey of the early modern political theory canon, emphasizing texts and writers from the 17th and 18th centuries. (PT)

[GOVT 6101 Political Identity: Race, Ethnicity, and Nationalism

Fall. 4 credits. Next offered 2010-2011. M. Jones-Correa.]

[GOVT 6121 American Political Development in the 20th Century (also AMST 6121, AMST/GOVT 4041)

Fall. 4 credits. Next offered 2010-2011. E. Sanders.

For description, see GOVT 4041.]

GOVT 6132 The Politics of Inequality

Spring. 4 credits. S. Mettler.

In the mid-20th century United States, egalitarianism seemed to be on the rise: the ranks of the middle class swelled and policy makers eradicated laws that had long sanctioned racial and gender hierarchies. Then, beginning in 1973 and to the present, economic inequality escalated, stratifying Americans by income and wealth and reinforcing old cleavages that the civil rights and feminist movements had sought to overcome. This course investigates how American politics has influenced and been shaped by these developments. We will examine trends across the political system, investigating aspects of political voice, including political participation and public opinion; political institutions, including Congress, political parties, and interest groups; and public policy, considering the extent to which it ameliorates or fosters inequality. The course offers a broad survey of important literature in the field of American politics.

GOVT 6142 Causes and Consequences of U.S. Foreign Policy (also AMST 4142/6142, GOVT 4142)

Fall. 4 credits. E. Sanders.

For description, see GOVT 4142.

[GOVT 6151 State and Economy in Comparative Perspective

Fall. 4 credits. Next offered 2011-2012. R. Bensel.]

[GOVT 6171 Politics of Public Policy

Spring. 4 credits. Next Offered 2010-2011. S. Mettler.]

GOVT 6202 Political Culture (also AMST 6202)

Spring. 4 credits. R. Bensel.

This graduate course will explore the relationship between popular belief, political action, and the institutional deployment of social power. The class will be roughly divided in three parts, opening with a discussion of the material foundations of cultural ideation in socioeconomic "practice." The middle section will connect ideation to political ideology, including symbolism and group identity. The last portion of the course will consider the impact of both cultural ideation and political ideology on institutional structure and legitimation. This section will also trace how political regimes can influence, coming full circle, to the material foundations of cultural ideation.

[GOVT 6264 Social Movements in Latin America (also GOVT 4264)

Fall. 4 credits. Next offered 2010-2011. K. Roberts.

For description, see GOVT 4264.]

[GOVT 6274 People, Markets, and Democracy

Fall. 4 credits. Next offered 2010-2011. C. Anderson.

Examines the relationship between the economy and democracy. Focuses on behavioral political economy in democratic or democratizing countries. Major topics include inequality and democratic performance.]

GOVT 6291 Contemporary American Politics (also AMST 4241/6291, GOVT 4241)

Spring. 4 credits. M. Shefter.

For description, see GOVT 4241. (AM)

GOVT 6301 Institutions (also AMST 6301)

Fall. 4 credits. R. Bensel.

This graduate course will explore the ways in which institutional rules shape the conduct and outcome of politics as collective decision-making and deliberation. The focus will be primarily on the United States Congress where the literature on institutional design and structure is both comprehensive and deep. Subordinate sections of the course will cover the general literature on theories of institutional formation and influence over politics, as well as briefly addressing law and judiciaries in order to broaden the sampling of specific cases and applications.

GOVT 6324 Proseminar in Chinese Politics

Spring. 4 credits. A. Mertha.

GOVT 6334 Political Economy of Development

Fall. 4 credits. K. Roberts and K. Morrison.

This course provides an overview of major theoretical and empirical works regarding the political determinants of improvements in human well-being. Focusing broadly on issues of economic growth and distribution, the topics we will cover include economic reform, industrialization strategies, agricultural development, the institutional foundations of growth, human capital development, regional inequality, and poverty reduction. Along the way, we will encounter a variety of theoretical traditions as well as methodological approaches and touch on most regions of the world.

GOVT 6353 Field Seminar in Comparative Politics

Fall. 4 credits. S. Tarrow.

This course provides an introduction to comparative politics, introducing students to classic works as well as recent contributions that derive from those works. Topics to be covered include democracy, authoritarianism, state-building, political parties, welfare states, and social movements and revolutions. Members of the subfield will join the seminar on alternative weeks to develop each topic introduced by the classical readings. (CO)

GOVT 6384 Democracy and the Media

Spring. 4 credits. T. Zittel.

The relationship between democracy and the media is conflict-laden. Modern democracy would be on the one hand impossible without media. Media are considered on the other as a potential threat to modern democracy. The increasing pervasiveness of mediated political communication emphasizes the tension between democracy and the media to increasing degrees. This class aims at an in-depth survey on the concepts that we use to analyze the relationship between democracy and the media and on the findings emerging from empirical research guided by these concepts. The class adopts a comparative perspective to understand the impact of contextual factors on the relationship between democracy and the media.

[GOVT 6393 Comparative Political Participation

Fall. 4 credits. Next offered 2011-2012. S. Martin.]

GOVT 6413 Revitalizing Labor: A Comparative Perspective (also ILRIC 6320)

Spring. 4 credits. L. Turner.

For description, see ILRIC 6320.

[GOVT 6423 Feminist Methodology (also FGSS 6170)

Spring. 4 credits. Next offered 2010-2011. S. Martin.

For description, see FGSS 6170.]

GOVT 6461 Public Opinion

Spring. 4 credits. P. Enns.

This course provides an introduction to the vast literature devoted to public opinion. We will survey the major theoretical approaches and empirical research in the field of political behavior, although we will touch on participation and voting only in passing. The primary focus will be on American public opinion, although there will be some attention to comparative work. In addition to empirical research on the antecedents of opinion and its role in the larger political system, we will consider normative work on the meaning and measurement of opinion and on its role in democratic politics. (AM)

GOVT 6474 States and Societies in the Middle East (also GOVT 4374, NES 4874/6874)

Spring. 4 credits. D. Patel.

This seminar surveys research approaches and puzzles in contemporary Middle Eastern politics. Students will be introduced to some of the major arguments, hypotheses and debates in the literature. Topics to be considered include: the nature and legacies of colonialism, state-building and the character of contemporary Middle Eastern regimes, the political economy of oil, economic crises, elections and political 'liberalization,' and the

role of Islamism in political, social, and economic life. The seminar is designed principally for graduate students who focus their research on the Middle East and advanced undergraduates who have taken courses in Middle Eastern politics or history.

GOVT 6523 Methods for Field Research
Fall. 4 credits. D. Patel.

This research seminar surveys the study of political culture. The course is designed to assess the strengths and weaknesses of various approaches that seek to account for the influence of culture on economic and political behavior and institutions, and to account for shifts in culture over time. A wide range of methodological approaches within political science are examined, as well as approaches from anthropology, sociology, and economics. Applications include ethnicity and identity, conflict, regime type, and economic growth. The focus is on how rationalist and institutionalist approaches ignore or incorporate political culture through choice, coordination, and common knowledge.

GOVT 6544 Gender and Politics (also FGSS 6544)

Fall. 4 credits. S. Martin and S. Mettler. What role does gender play in political behavior, law, and public policy? How can we explain the variation in that role across historical and national contexts? This course considers the social, cultural, and institutional mechanisms through which states structure gender roles and relations. It also investigates how gender regimes influence patterns of political activism and social change. We will examine puzzles such as why greater gender equality is found in some political contexts than others, and why states feature different configurations of rights and restrictions with respect to gender, for example with some granting relatively high degrees of social equality while restricting reproductive freedom, and vice versa. Specific attention will be given to how gender categories and debates shape the discipline of political science, shaping the questions we ask and the answers we find.

GOVT 6564 Comparative Political Representation

Fall. 4 credits. T. Zittel. This class offers an in depth examination of main problems of political representation from a comparative perspective. The main focus will be on the established Western democracies. The class is structured in three main parts. In its first part we will discuss core theoretical concepts guiding the comparative analysis of representative systems. The second part will consist of a discussion of the empirical literature on representative systems; of differences between democratic systems, of the causes for these differences and of their consequences. A third part deals with the question, whether representative democracy is in need of reform because of a lack of performance and/or because of a changing social and technological environment.

GOVT 6585 American Political Thought (also AMST 6585, AMST/GOVT 4585)

Spring. 4 credits. J. Frank.
For description, see GOVT 4585.

[GOVT 6603 States and Social Movements (also SOC 6600)

Spring. 4 credits. Next offered 2010–2011.
S. Tarrow.

This course is a broad examination of several types of contentious politics—social movements, civil wars, nationalist episodes and revolutions in different parts of the world. (CO)]

[GOVT 6625 Field Seminar in Political Theory

Fall. 4 credits. Next offered 2010–2011.
J. Frank.

Introduces students to several contemporary approaches to political theorizing, with an emphasis placed on different modes of interpretation. Authors read may include: Althusser, Arendt, Butler, Foucault, Habermas, Kristeva, MacIntyre, Skinner, Strauss, Taylor, Wolin, and Zizek. (PT)]

[GOVT 6645 Democratic Theory (also AMST 6645)

Fall. 4 credits. Next offered 2010–2011.
J. Frank.]

[GOVT 6665 Media Theory: Film and Photograph (also VISST 6466)

Spring. 4 credits. Next offered 2011–2012.
D. Rubenstein.]

GOVT 6675 Derrida and Philosophy of Hospitality (also GOVT 4646, HADM 5590, COML 6675)

Fall. 4 credits except for HADM, which is 3 credits.
For description, see GOVT 4646.

GOVT 6695 Modern Social Theory I

Fall. 4 credits. S. Buck-Morss. Topics vary. In fall 2009, we will reflect philosophically and politically on Imagination, dealing with theories of the image and its social participation. Our approach will be cognitive-empirical rather than romantic-artistic. Aesthetic here means experiential, i.e., perceptible through the senses. Collectively shared images are examined as social facts endowed with political power, not artistic representations created by genial subjects. With the invention of camera/digital technology, image-events have become determinant in history. Moving (away) from the modern philosophic canon—Kant, Hegel, Dewey, Adorno—we will consider imagination as a social process in the pre-printing press past (Mondzain on the icon), the post-printing press present (Benjamin on the image), and the digital future (neuro-scientific theories, imagination as metaphor). (PT)

GOVT 6705 Modern Social Theory II

Spring. 4 credits. S. Buck-Morss. In spring 2010, we will read Walter Benjamin's *Arcades Project*. We will approach the text as a materialist philosophy of history with a political intent, paying special attention to the work of social theorists whom he cites in the project: Karl Marx (dreamworlds), Georg Simmel (urban life), Charles Fourier (communism), St-Simonians (industrial utopia) Bakunin (revolution) and Claire Démar (feminism). Advanced seminar, not recommended for undergraduates.

[GOVT 6726 Psychoanalysis and Ideology

Spring. 4 credits. Next offered 2011–2012.
D. Rubenstein.]

GOVT 6775 Language and Politics

Spring. 4 credits. J. Frank.

This course explores the “linguistic turn” of recent political theory alongside canonical debates over the political and epistemological consequences of different philosophies of language. Writers examined will include Locke, Rousseau, Nietzsche, Wittgenstein, Austin, Derrida, Butler, and Cavell.

[GOVT 6807 Topics in Comparative and International Political Economy

Spring. 4 credits. Next offered 2011–2012.
T. Pepinsky.

Seminar covering current research on political economy, focusing on trade, finance, production, migration, development, welfare, and regime change.]

GOVT 6827 Unifying While Integrating: China and the World (also CAPS/GOVT 4827)

Spring. 4 credits. A. Carlson.
For description, see GOVT 4827.

[GOVT 6857 International Political Economy

Fall. 4 credits. Next offered 2010–2011.
P. Katzenstein.

Exploration into a range of contemporary theories and research topics in the field of international political economy. The seminar covers different theoretical perspectives and a number of substantive problems. (IR)]

GOVT 6867 War, States, and Contention

Fall. 4 credits. S. Tarrow.

This course will examine the relationships among state-building, war-making, and contention over rights in wartime, in preparations for war, and in the wake of war. It asks: first, do states expand rights or retract rights during or after wars; second, are there certain kinds of rights (for example, rights related to war mobilization) that are repressed during wars, while others (those peripheral to mobilization) are expanded—for example, the suffrage; third, are some kinds of wars more or less restrictive of rights than others; Fourth, do wars like the “War on Terror” reduce the incentives for states to extend rights and increase their tendency to retract or abuse rights; finally, how do social movements respond to the expansion of executive authority and the limitation of rights during wars?

[GOVT 6887 Political Economy and National Security

Spring. 4 credits. Next offered 2010–2011.
J. Kirshner.

This seminar considers the relationship between economics and national security. Specific topics will change from year to year, but will typically include the following: the economic foundations of power, economic coercion, the economic roots of conflict, and the ways in which structural changes in the international economy shape and limit state authority. (IR)]

[GOVT 6897 International Security Politics

Fall. 4 credits. Next offered 2011–2012.
P. Katzenstein and J. Weeks.

This seminar introduces students to a variety of theoretical perspectives and empirical approaches related to international conflict, peace, and security. (IR)]

GOVT 6917 Normative Issues in IR (also GOVT 4888, PHIL 4471/6470)

Spring. 4 credits. R. Miller
For description, see PHIL 4471.

GOVT 6927 Administration of Agriculture and Rural Development (also IARD 6060)

Spring. 4 credits. N. Uphoff and
T. W. Tucker.
For description, see IARD 6030.

GOVT 6999 CIPAs Weekly Colloquium

Fall, spring. 1 credit. S-U grades only.
T. Lowi.
Colloquium is the weekly seminar series hosted by the Cornell Institute for Public Affairs (CIPA). It is also a required, 1-credit course for all CIPA Fellows and is graded S-U based on attendance. The colloquium series is a collaborative effort between the CIPA Colloquium Committee and the faculty and staff of CIPA.

[GOVT 7035 Political Economy

Fall. 4 credits. Next offered 2010-2011.
J. Kirshner.
This course will undertake a general survey of the classical and modern theories of political economy. The works of Smith, Keynes, Shumpeter, and Hayek, among others, will be studied and placed within the context of the history and evolution of the thought, practice, and method of the field. Issues pertaining to the politics of macroeconomics and money will be of prominent (but not exclusive) interest in the course. (PT)

GOVT 7063 Labor in Global Cities (also ILRCB 7060)

Fall. 4 credits. L. Turner.
For description, see ILRCB 7060. (CO)

GOVT 7073 Game Theory 1: Perfect Information

Fall. 4 credits. K. Morrison.
Game theory is a tool for studying strategic interaction. This course offers a critical introduction, with applications to comparative politics, American politics, and international relations. We will study the core concepts of game theory; how to formulate, solve, and empirically test games in ways that help advance research; and how to assess game-theoretic arguments in the political science literature. The course requires no prior training in game theory or formal methods.

GOVT 7074 Game Theory 2: Advanced Topics

Spring. 4 credits. Prerequisite: GOVT 7073.
K. Morrison.
This is the second of two graduate courses on game theory in the government department. In the first half of this course, we will focus on advanced topics, including coalitional games, games of imperfect information, evolutionary games, and bargaining. The second half of the course will be focused on helping students develop their own models, using the techniques learned in both of the courses.

GOVT 7281 Government and Public Policy (also AMST 4281/6281, GOVT 4281)

Fall. 4 credits. T. J. Lowi.
For description, see GOVT 4281. (AM)

[GOVT 7625 Sexuality and the Law (also FGSS 4610/7620, GOVT 4625)

Spring. 4 credits. Next offered 2011-2012.
A. M. Smith.
For description, see GOVT 4625.]

GOVT 7999 Independent Study

Fall or spring. 4 credits. *Not* open to undergraduates. Undergraduates wishing to conduct supervised study should register for GOVT 4999.

Individualized readings and research for graduate students. Topics, readings, and writing requirements are designed through consultation between the student and the instructor. Graduate students in government who are looking to use this as an option to fulfill their course requirements should check with their chairs to be certain that the program of study is acceptable for this purpose. Applications must be completed and signed by the instructor and by the chairs of their special committees. They are available from, and must be returned to, the graduate assistant in 212 White Hall.

GREEK

See "Department of Classics."

HEBREW

See "Department of Near Eastern Studies."

HIEROGLYPHIC EGYPTIAN

See "Department of Near Eastern Studies."

HINDI-URDU

See "Department of Near Eastern Studies."

HISTORY

B. Strauss, chair; T. R. Travers, director of graduate studies; R. Craib, director of undergraduate studies; E. Baptist, V. Caron, H. Case, D. Chang, J. Chen, Z. Chen, S. Cochran, D. Corpis, P. Dear, O. Falk, M. C. Garcia, D. Ghosh, S. Greene, T. J. Hinrichs, K. Hirano, I. Hull, P. Hyams, S. Kaplan, D. Lacapra, F. Lovevall, T. Loos, D. Magaziner, R. Moore, J. Najemy, M. B. Norton, J. Parmenter, R. Polenberg, W. Provine, H. Rawlings, E. Rebillard, C. Robcis, A. Sachs, B. Strauss, E. Tagliacozzo, T. R. Travers, C. Verhoeven, M. Washington, R. Weil, J. Weiss. Emeritus: D. Baugh, S. Blumin, J. John, M. Kammen, W. LaFeber, C. Peterson, W. Pinter, J. Silbey, F. Somkin, B. Tierney

The popularity of history among Cornell students is due to its usefulness as preparation for graduate, professional, or law school and for any career that requires critical thinking and good writing; the reputation of the faculty for scholarship, teaching, and advising; and most of all, the intrinsic interest of the discipline. A wide variety of introductory and advanced courses is offered. The department is particularly strong in ancient, medieval, and modern European history; in American, Latin American, and Asian history; and in the history of science.

Advanced Placement

Students who pass the AP American and/or European History exam with a score of 4 or 5 have two options: (1) use the AP credits to fulfill the Arts and Sciences course credit requirements for graduation, or (2) take introductory American and/or European history courses.

The Major

To complete the history major, a student must fulfill the requirements listed below:

Entry requirement: completion of *any* two history courses excluding first-year writing seminars.

1. Take nine history department courses (for either 3 or 4 credits each), completing all of them with a grade of C or better. (Courses taken for entry may count toward fulfilling the major.)
2. Of the total nine courses:
 - a. four must be in courses designated as outside U.S. history and
 - b. three must be in courses designated as history before 1800.

(Courses that count toward the Arts and Sciences historical breadth requirement do not necessarily count toward the history major.)

Courses used to fulfill requirement (1) above may also be used to fulfill requirement (2), in respect both to (a) and (b) if applicable. A course in American history before 1800 may be used to fulfill requirement (2b). A course before 1800 in a field other than American history can be used toward fulfillment of both requirements (2a) and (2b).

A list of those courses that fulfill the "outside U.S." and "pre-1800" requirements is maintained by the history department. Only courses from that list fulfill these requirements.

3. Two of the nine courses must be seminars, of which one must be a 4000-level seminar. Starting fall 2008, HIST 4000, 4001, and 4002 may not be used to fulfill the 4000-level seminar requirement.

Honors

The history department offers an honors program for students who wish to research and write a thesis during their senior year. In addition to writing the thesis, honors students must maintain a 3.5 average in their history courses, take HIST 4000 Honors Proseminar during their junior year plus an additional 4000-level seminar, preferably during their junior year, and complete 10 courses in history (for 3 or 4 credits each). During the second semester of the sophomore year or early in the junior year, interested students should speak to a faculty member or faculty advisor about the honors program.

Before the beginning of the senior year, the candidate presents, in conversation or in writing, a thesis proposal to an appropriate member of the faculty. The faculty member who approves the proposal ordinarily becomes the thesis supervisor. If for any reason it is necessary to change supervisors, this arrangement should be confirmed no later than the fourth week after the beginning of the candidate's senior year.

Honors candidates should register in HIST 4001, a seminar course in honors research. Any exceptions to this must be approved by the Honors Committee. HIST 4001 is a 4-credit course that permits honors candidates to conduct research and to begin writing the honors essay in a seminar environment. At the end of the first semester of the senior year, as part of the requirements for HIST 4001, the student submits to the supervisor a 10- to 15-page overview, or, alternatively, a preliminary draft of some part of the thesis along with an outline of the whole to the instructor of 4001 and to the student's supervisor. HIST 4002 is a 4-credit seminar course that permits honors candidates to complete the honors essay and to demonstrate their understanding of the ways in which the themes explored in the thesis fit into a larger historical context.

The completed thesis is evaluated by three readers, including the supervisor and a first reader selected by the student, in consultation with his or her supervisor.

The text of the honors essay may not exceed 60 pages except by permission of the chair of the Honors Committee and the student's supervisor. Three copies are due during the third or fourth week of April. In May, each honors candidate is given an oral exam administered by the supervisor; exam focuses on the essay as well as the specific subfield of history in which the student has conducted research (e.g., Periclean Athens, 17th-century science, 19th-century American politics).

To qualify for a bachelor of arts degree with honors in history, a student must (1) sustain at least a 3.5 cumulative average in all history courses and (2) earn at least a cum laude grade on the honors essay and on the oral exam.

Note: History majors who wish *both* to study abroad (or in Cornell-in-Washington) and to enter the honors program should consult their advisors or the DUS as soon as possible after declaring a major. The department requires honors students to enroll in HIST 4000 before writing a thesis in their senior year, and only in exceptional cases are students allowed to enroll simultaneously in 4000 and 4001 (the first term of thesis-writing). So planning ahead is essential, especially if you intend to spend a full year abroad.

Cornell in Washington Program. History majors may apply to the Cornell in Washington program to take courses and undertake a closely supervised externship during a fall or spring semester.

Category Key: Courses in History are broken into different categories. To determine which category(s) a course falls in, please note the reference at the end of each course description. The key is as follows: AF = African History, AM = American History, AS = Asian History, CO = Comparative History, EA = Ancient European History, ER = Renaissance and Medieval History, EM = Modern European History, HS = History of Science, LA = Latin American History, NE = Near Eastern History, and HR = Honors, Reading, and Research.

First-Year Writing Seminars

[HIST 1103 First-Year Writing Seminar: Immigrant Experiences (also AAS 1103)]

Spring. 3 credits. Next offered 2010–2011. D. Chang.]

HIST 1141 First-Year Writing Seminar: Witchcraft in the Early Modern Atlantic World

Spring. 3 credits. D. Corpis.

This seminar examines how European beliefs about witchcraft and magic were exported to Africa and the Americas in the period 1500–1800. We will explore how non-European concepts of the supernatural and magical intersected with European ideas during the initial stages of European colonial expansion. We will read a range of documents, including transcripts from witch trials, treatises about witchcraft, and books written by historians that interpret the historical meaning of witchcraft. Students will write a range of papers that aim to answer the following types of questions: Were witches figments of the European imagination? Why were the people accused of witchcraft more often women than men? Why did Europeans believe that Native Americans or Africans were likely to be involved in witchcraft? (EM)

HIST 1230 First-Year Writing Seminar: Monstrous Births, Scheming Midwives: Childbirth in Europe 1500–1700

Fall. 3 credits. Students should register through First-Year Writing Program. R. Weil.

When Mary Toft gave birth to rabbits in 1726, only some (but not all) doctors thought she was faking. Why was her story plausible, and how were the rabbits explained? Who controlled childbirth, and who had the power to decide whether a pregnancy was real? How did Mary Toft experience the event? Monstrous births, dishonest midwives, infanticide, and the powers of pregnant women were topics of fascination and debate in early modern Europe and America. In this course we use writings by midwives, medical treatises, letters, autobiographies, news reports, and trial records to examine practices and beliefs surrounding childbirth, and at how these in turn reflected concerns about property, sexuality, health, and religion. (EM)

HIST 1240 Democracy and Its Discontents: Political Traditions in the United States (also AMST 1240) (HA-AS)

Summer. 3 credits. N. Salvatore. For description, see AMST 1240. (AM)

[HIST 1400 First-Year Writing Seminar: Kipling's India: Literature, Culture, History]

Fall. 3 credits. Next offered 2010–2011. T. R. Travers.]

[HIST 1401 First-Year Writing Seminar: From Lagos to New Orleans]

Fall. 3 credits. Next offered 2011–2012. D. Magaziner.]

Introductory Courses

HIST 1510 Introduction to Western Civilization # (HA-AS)

Summer and fall. 4 credits. D. Corpis. The West and its relations with the rest of the world are central topics today, but just what is the West and what is its history? This course

surveys the history of the West from remote antiquity to the 16th century. We will consider developments in technology, economy, politics, religious institutions and faiths, cultural media and social ideals. Together, these themes add up to civilization in the west. We will acquaint ourselves with these dimensions of the past while seeking to acquire the basic skills professional historians use to learn about this past. (ER) (EM)

HIST 1511 Introduction to Western Civilization Part II # (HA-AS)

Summer and spring. 4 credits. H. Case and T. R. Travers.

This course introduces students to the major social, intellectual, political, cultural, artistic, and literary events and movements that emerged in Europe since the Protestant Reformation. Readings will offer a variety of perspectives on topics such as: modernity and its meaning, revolution (industrial, social, political, cultural, artistic), imperialism, war, and the emergence of modern ideologies (capitalism, communism, liberalism, fascism). (ER) (EM)

HIST 1530 Introduction to American History (also AMST 1530) # (HA-AS)

Fall and summer. 4 credits. HIST 1530 is not a prerequisite for HIST 1531. M. B. Norton.

A survey of American history from the beginnings through the Civil War. Topics include cultural encounters in the age of Columbus, European colonization, the American Revolution, the early republic, westward expansion, and the origins and outcome of the Civil War. (AM)

HIST 1531 Introduction to American History, 1865–Present (also AMST 1531) (HA-AS)

Summer and spring. 4 credits. HIST 1530 is not a prerequisite for HIST 1531. A. Sachs. An introductory survey of the development of the United States since the Civil War. (AM)

[HIST 1900 East Asia to 1800 (also ASIAN 1190) @ # (HA-AS)]

Spring. 4 credits. Next offered 2010–2011. T. J. Hinrichs and K. Hirano.]

HIST 1910 Introduction to Modern Asian History (also ASIAN 1191) @ (HA-AS)

Fall. 4 credits. S. Cochran and E. Tagliacozzo.

The history of Asia–Pacific from the 19th century to the present, focusing on relations of India and Southeast Asia with each other and with the west. (AS)

HIST 1950 Colonial Latin America (also AIS/LATA 1950) # @ (HA-AS)

Fall. 4 credits. R. Craib.

This course is a general introduction to, and overview of, the history of Latin America from the initial “encounters” of peoples from Africa and Iberia with the “New World,” through the movements for independence in most of mainland Latin America in the early 19th century, to the collapse of Spanish colonial rule in the Pacific and Caribbean later that century. Through lectures, discussions and the reading of primary sources and secondary texts, the course examines the economic and social organization of the colonies, intellectual currents and colonial science, native accommodation and resistance to colonial rule, trade networks and imperial expansion, labor regimes and forms of economic production, and migration and movement. No prior knowledge of Latin American history is required. (LA)

HIST 1960 Modern Latin America (also LATA 1960) @ (HA-AS)

Spring. 4 credits. R. Craib.

An introductory survey of Latin American history from the early 19th century to the present with particular emphasis on processes of nation-state formation and the development of capitalist economies. Prominent themes include U.S.-Latin American Relations; neocolonialism; and radicalism and revolutionary movements, explored through a variety of primary and secondary sources. (LA)

HIST 2001 Supervised Reading

Fall or spring. 2 credits. Prerequisite: junior or senior standing. Permission of instructor required. Staff. (HR)

Sophomore Seminars**HIST 2020 The Court, Crime, and the Constitution (also AMST 2022) (HA-AS)**

Fall. 4 credits. Limited to 15 students. Permission of instructor required. R. Polenber.

A seminar designed for sophomores but open to others as space permits. An examination of 20th-century Supreme Court decisions on such issues as the "third degree," illegal search and seizure, the exclusionary rule, and the right against self-incrimination. Special attention will be given to events leading up to *Miranda v. Arizona* in 1966, and to the ways the Court has modified that holding. (AM)

[HIST 2030 Wilderness in North American History and Culture (also AMST 2033) # (HA-AS)

Fall. 4 credits. Limited to 15 students. Priority given to sophomores. Students must commit to a weekend-long field trip in Sept. Next offered 2010-2011. A. Sachs.]

[HIST 2050 The French Enlightenment: Methods, Ambitions, Contradictions # (HA-AS)

Fall. 4 credits. Limited to 15 students. Next offered 2011-2012. S. Kaplan.]

[HIST 2061 Small Wars in Greece and Rome (also CLASS 2686) # (HA-AS)

Fall. 4 credits. Limited to 15 students. Next offered 2010-2011. B. Strauss.]

[HIST 2070 The Occidental Tourist: Travel Writing and Orientalism in Southeast Asia (also ASIAN 2206/5507, HIST 5070) @ (CA-AS)

Spring. 4 credits. Limited to 15 students. Prefer (but not required) that students have taken HIST 1910 or 3960. Letter grades only. Next offered 2010-2011. T. Loos.]

[HIST 2081 Microhistory and the Margins of Early Modern European # (HA-AS)

Spring. 4 credits. Limited to 15 students. Next offered 2011-2012. D. Corpis.]

[HIST 2090 Seminar in Early American History (also AMST/FGSS 2090) # (HA-AS)

Fall. 4 credits. Limited to 20 students. Next offered 2010-2011. M. B. Norton.]

[HIST 2100 The Government of God # (HA-AS)

Spring. 4 credits. Limited to 15 students. Next offered 2010-2011. O. Falk.]

[HIST 2110 Black Religious Traditions: Sacred and Secular (also AMST/RELST 2110) (HA-AS)

Spring. 4 credits. Limited to 15 students. Letter grades only. Next offered 2010-2011. M. Washington.

A survey on the black religious and spiritual traditions during bondage and the early years of freedom. This course will examine slave religion, the rise of black churches in the North, the formation of black churches after the Civil War, the independent church movement and the churches' role in social protest. (AM)

[HIST 2120 African-American Women in the 20th Century (also AMST/FGSS 2120) (HA-AS)

Spring. 4 credits. Limited to 15 students. Next offered 2010-2011. M. Washington.]

[HIST 2141 Crusade, Heresy, and Inquisition in the Medieval Mediterranean # (HA-AS)

Spring. 4 credits. Limited to 15 students. Next offered 2011-2012. P. Hyams.]

[HIST 2161 Iran and the World @ (HA-AS)

Fall. 4 credits. Next offered 2010-2011. J. Weiss.]

[HIST 2170 Subversion as Foreign Policy (HA-AS)

Fall. 4 credits. Next offered 2012-2013. T. Loos and R. Craib.]

HIST 2180 Seminar on Genocide (HA-AS)

Fall. 4 credits. Limited to 15 students. Permission of instructor required. I. Hull. This course examines some of the most terrible events of the 20th century, events such as the mass murders of the Armenians (1915-1918), the European Jews (1939-1945), the Cambodians (1975-1979), and the Hutus of Rwanda (1994). Students will apply historical methods to address such questions as the preconditions leading to genocide; the relation of genocide to war, revolution, nation-building, and ideology; the motivations of perpetrators; the limits to victim's efforts at self-defense; the responses of the regional or world community; and the legal and political consequences of such acts. (EM)

[HIST 2190 Women and Gender in South Asia: State and Society from Pre-Colonial to Post-Colonial (also ASIAN 2219, FGSS 2190) @ (HA-AS)

Fall. 4 credits. Limited to 15 students. Next offered 2010-2011. D. Ghosh.]

[HIST 2200 Travel in American History and Culture (also AMST 2200) (HA-AS)

Spring. 4 credits. Limited to 15 students. Next offered 2010-2011. A. Sachs.]

[HIST 2210 Pop Culture in China (also ASIAN 2210) @ (HA-AS)

Spring. 4 credits. Next offered 2010-2012. T. J. Hinrichs.]

[HIST 2211 Seminar: The Blues and American Culture (also AMST 2211) (HA-AS)

Fall. 4 credits. Limited to 15 students. Permission of instructor required. Next offered 2010-2011. R. Polenber.]

[HIST 2230 International Law (HA-AS)

Spring. 4 credits. Limited to 15 students. Next offered 2010-2011. I. Hull.]

[HIST 2250 The U.S.-Mexico Border: History, Culture, Representation (also AMST/LSP 2250) (CA-AS)

Fall. 4 credits. Next offered 2010-2011. M. C. Garcia.]

[HIST 2261 Society and Religion in China (also ASIAN 2226) @ # (HA-AS)

Fall. 4 credits. Limited to 15 students. Next offered 2010-2011. T. J. Hinrichs.]

[HIST 2271 Family Life in Renaissance Italy (also ITAL 2270) # (HA-AS)

Spring. 4 credits. Limited to 15 students. Next offered 2010-2011. J. Najemy.]

HIST 2272 Study of Terrorism (HA-AS)

Fall. 4 credits. C. Verhoeven. This seminar examines approaches to the study of European terrorism. By the end of the semester, students should have a grasp of (1) the history of terrorism as it developed over the course of the 19th and early 20th centuries (learning in the process how to distinguish terrorism from other forms of modern political violence, e.g. partisan warfare, state terror, etc.) and (2) the ways terrorism has been perceived, presented, and remembered by contemporaries and subsequent generations. Questions, therefore, will include the following: How has terrorism been approached by political theory, history, literature, etc.? How have these approaches constructed terrorism as an object of scientific investigation? How were terrorists perceived and represented by their contemporaries (in the press, literature, art)? How did terrorists represent themselves (in political pamphlets, autobiographies, fiction)? Readings will include archival materials, manifestos, memoirs, and novels, as well as classic pieces of political writing (e.g. Lenin, Schmitt, Arendt). (EM)

[HIST 2280 Indian Ocean World (also ASIAN 2228) @ # (HA-AS)

Spring. 4 credits. Limited to 15 students. Next offered 2010-2011. E. Tagliacozzo.]

[HIST 2290 Jefferson and Lincoln: American Ideas about Freedom (HA-AS)

Spring. 4 credits. Limited to 15 students. Priority given to underclassmen. Next offered 2010-2011. E. Baptist.]

[HIST 2300 Seminar in History and Memory @ (HA-AS)

Fall. 4 credits. Limited to 15 students. Next offered 2010-2011. J. V. Koschmann.]

HIST 2308 Caribbean History (also ASRC 2308) (HA-AS)

Fall. 3 credits. J. Byfield. For description, see ASRC 2308. (AF)

[HIST 2321 Introduction to Military History # (HA-AS)

Fall. 4 credits. Next offered 2011-2012. B. Strauss.]

HIST 2330 Origins of the Social (also GOVT 2729) (HA-AS)

Spring. 4 credits. Limited to 15 students. Permission of instructor required. C. Robcis.

Political philosophy has often been preoccupied with the problem of "the social": how is society born? How do individuals come together and what allows gives their actions and discourses an overall framework? How does a population become a community governed by explicit and implicit rules, norms, mechanisms of inclusion and exclusion? And

Errata

To correct an error in the print version replace the word Hutus with Tutsis in the description of HIST 2180

how does this social formation address questions of power and law, state and nation, equality and justice, identity and difference, citizenship and civility? This seminar provides an introduction to some of the major figures of European intellectual history who have attempted to think and rethink this problem of "the social." The class will focus on the close reading and the historicization of each text. Readings will include Hobbes, Locke, Rousseau, Marx, Stuart Mill, Durkheim, Mauss, Freud, Levi-Strauss, Derrida, Gayle Rubin, Monique Wittig, Carole Pateman, Judith Butler. (EM)

[HIST 2331 French Thought after May '68 (also COML 2331/GOVT 2626) (HA-AS)]

Spring. 4 credits. Next offered 2010–2011. C. Robcis.]

[HIST 2340 Seminar: Gender in Early Modern Europe (also FGSS 2340) # (CA-AS)]

Fall. 4 credits. Limited to 15 students. Designed for underclassmen but open to all students. Permission of instructor required. Next offered 2010–2011. R. Weil.]

[HIST 2350 Antisemitism and the Crisis of Modernity (also JWST 2350) (HA-AS)]

Fall. 4 credits. Limited to 15 students. Next offered 2010–2011. V. Caron.]

[HIST 2360 Native Peoples of the Northeast (also AMST 2360) # (HA-AS)]

Spring. 4 credits. Limited to 15 students. Next offered 2010–2011. J. Parmenter.]

HIST 2380 Families in China since the 17th Century (also ASIAN 2238) @ (HA-AS)]

Fall. 4 credits. S. Cochran. It is often said that "traditional familism" has always provided the bedrock of Chinese society and continues to do so today. This course considers how Chinese families have coped with powerful forces for change—social upheavals, military conflicts, political revolutions, and economic transformations. Readings are all in English and include translations of letters, diaries, memoirs, and novels as well as historical interpretations of family life. (AS)

[HIST 2390 Seminar in Iroquois History (also AIS/AMST 2390) # (HA-AS)]

Fall. 4 credits. Limited to 15 students. Next offered 2011–2012. J. Parmenter.]

[HIST 2410 Riot and Revolution in 19th-Century Africa: The Birth of the Modern (also ASRC 2303) @ # (HA-AS)]

Spring. 4 credits. Limited to 15 students. Next offered 2010–2011. S. Greene.]

[HIST 2411 Enslaved! Then and Now # (HA-AS)]

Fall. 4 credits. Next offered 2011–2012. S. Greene.]

HIST 2412 The White Image in the Black Mind (also ASRC 2307) @ (HA-AS)]

Fall. 4 credits. S. Greene. The course will explore a variety of historical, literary, and cinematic texts, produced by Africans, Asians and African Americans, that reveal as much about the producers of the texts as they do about "The European." (AF)

[HIST 2420 Religion and Politics in American History: From J. Winthrop to R. Reed (also AMST/RELST 2420) (HA-AS)]

Fall. 4 credits. Limited to 15 students. Permission of instructor required. Next offered 2010–2011. R. L. Moore.]

HIST 2430 History of Things (HA-AS)]

Spring. 4 credits. Limited to 15 students. E. Tagliacozzo.

This course will examine material culture as an avenue of looking at history in broad and comparative ways. The course is global in shape and unrestricted temporarily; it asks how "things" make up our world, and how they affect our lives historically and help shape the human story. Glass, dyes, opium, salt, coal, sugar, tea, and even shrunken heads will all be considered. (CO)

HIST 2440 The United States in Vietnam (also AMST 2440) (HA-AS)]

Spring. 4 credits. Limited to 15 students. F. Logevall.

The long U.S. involvement in Vietnam has been the subject of endless controversy and scholarly analysis in recent decades, and the debate shows little sign of ending anytime soon. This seminar will look closely the origins and course of the war, and at its impact on American politics and society. Though our focus will be on the U.S. side of the story, some attention will be paid also to Vietnamese perspectives. Course materials will include recent monographs as well fictional accounts, primary sources, and occasional films. (AS)

HIST 2461 Reading and Writing the African Diaspora (also ASRC 2309) @ (HA-AS)]

Spring. 4 credits. D. Magaziner.

This sophomore seminar considers the history, culture, politics, and imagination of the African diaspora from the era of the Atlantic slave trade to the present day. We begin with some foundational questions relating to the Middle Passage, the developed of African-derived communities in the Atlantic world, and the still-potent memories of enslavement. From there we move on to examine the political direction of global African identity in the 19th and 20th centuries, considering such issues as colonization, returnees, conversion to Christianity, anti-imperialism, pan-Africanism, racism, development and health, and the global cultural politics of black nationalism during the Cold War. Students will read a variety of primary and secondary works, as well as a number of novels, over the course of the semester. In addition, each student will be responsible for organizing and leading a class session and will develop an in-depth research paper on one of the course's issues. (AF)

[HIST 2470 The Age of Charlemagne (HA-AS)]

Spring. 4 credits. Limited to 15 students. Next offered 2010–2011. P. Hyams.]

[HIST 2480 Ghosts and Legacies: The Construction of Public Memory (HA-AS)]

Fall. 4 credits. Limited to 15 students. Next offered 2011–2012. J. Weiss.]

[HIST 2491 French Social Thought from Rousseau to Foucault (HA-AS)]

Spring. 4 credits. Limited to 15 students. Next offered 2010–2011. C. Robcis.]

Lecture Courses

HIST 2500 Technology in Society (also ECE/ENGRG 2500, STS 2501) (HA-AS)]

Fall. 3 credits. R. Kline. For description, see ENGRG 2500. (HS)

HIST 2510 Race and Popular Culture (also AMST 2501) (HA-AS)]

Fall. 4 credits. M. Washington. This course examines the intersection of race and popular culture in America, historically and thematically, focusing primarily on the black-white experience. Genres of minstrelsy, radio, film, and music provided forms of entertainment that were also mediums through which the racial "other" (black in this case) was often ridiculed and denigrated in order to promote and sustain "whiteness." However some appropriation of the "other" might involve genuine regard/appreciation of diverse cultural forms. This course explores the intersection of racial imagery, racial stereotypes, cultural borrowing, and the cultural diffusion in 19th- and 20th-century America. (AM)

HIST 2520 Modern East-Central Europe (HA-AS)]

Fall. 4 credits. H. Case. This course covers the key events, political ideologies, social and cultural trends, and definitions of East-Central Europe from 1848 to the present. Themes will include experiences of empire, war, and revolution, the rise of nationalism, liberalism, fascism, and communism, totalitarian regimes, dissident movements, the post-communist transition, the experiences and roles of women in the region's history, the fate of minorities and multi-national states, European integration, and the future of the region. (EM)

HIST 2530 Introduction to Islamic Civilization (also NES/RELST 2655) @ # (HA-AS)]

Fall. 3 credits. D. Powers. For description, see NES 2655. (NE)

HIST 2540 African Encounters with Colonialism (also ASRC 2304) @ (HA-AS)]

Spring. 4 credits. D. Magaziner. This course covers African history from roughly the 1840s to the present. It moves thematically from the Indian Ocean trade and economic relationships with Europe associated with the decline of the slave trade to the rise of "formal" imperialism, the construction and maintenance of the imperial states, decolonization, and the variety of post-colonialisms in different parts of the continent. Along the way it considers religion, popular culture, and different ways in which the West has attempted to understand Africa. (AF)

HIST 2550 The Past and Present of Pre-Colonial Africa (also ASRC 2306) @ (HA-AS)]

Spring. 4 credits. S. Greene. How has Africa's pre-colonial past influenced current events in Africa and elsewhere? To answer this question, this course explore the pre-19th-century histories of four different cultural areas in Africa (e.g., Ancient Egypt, the West African coast). Using both ancient and more recent oral traditions, travelers' accounts and visual images, we link these histories to current debates about the role of history in contemporary politics, the significance of race, class, and gender in times past and present, and the role of Africa in world affairs. (AF)

[HIST 2560 War and Peace in Greece and Rome (also CLASS 2680) # (HA-AS)

Spring. 4 credits. Next offered 2010-2011. B. Strauss.]

HIST 2571 China Encounters the World (also ASIAN 2257, CAPS 2570) @ (HA-AS)

Fall. 4 credits. J. Chen.

This is a lecture and discussion course focusing on how China has encountered the world since the 17th century, with an emphasis on the late 19th and 20th centuries. In particular, it will analyze the age-old Chinese "Central Kingdom" conception and how the conception was challenged during modern times as the result of Western and Japanese incursion and China's inability to deal with the consequences of the incursion. It will further analyze the impact of the Chinese "victim mentality" in order to pursue a deeper understanding of why radical revolutions have dominated China's modern history. While the emphasis of this course is China's external relations, foreign policy issues will be examined in the context of China's political, economic and social developments in broader terms. The course's purpose is not just to impart information but also to cultivate a basic understanding of the significance of the Chinese experience in the age of worldwide modernization. Grade in this class will be calculated on the basis of class participation, quizzes, midterm and final exams, and one essay assignment. (AS)

HIST 2580 Periclean Athens (also CLASS 2676) # (HA-AS)

Fall. 4 credits. H. Rawlings.

For description, see CLASS 2676. (EA)

[HIST 2590 The Crusades # @ (HA-AS)

Spring. 4 credits. Next offered 2010-2011. P. Hyams.]

HIST 2600 Latinos in the United States: Colonial to 1898 (also AMST 2599, LSP 2600) # (HA-AS)

Fall. 4 credits. M. C. Garcia.

This course examines the history of Latino populations in the United States from the Colonial period to 1898: how Mexican American, Puerto Ricans, Cubans, and other Latino populations emerged, and how they responded to and reshaped the societies in which they lived. Much of the course focuses on the "facts" of history (e.g. the Latino experience during key moments in American History such as the Texas revolution, the conquest of the West, the Spanish-American war, etc.) but the goal of the course is to help students learn to assess evidence, and conflicting interpretations. Readings will draw from political, social and cultural history. (AM)

[HIST 2610 Latinos in the United States: 1898 to the Present (also AMST/LSP 2610) # (HA-AS)

Spring. 4 credits. Next offered 2010-2011. M. C. Garcia.

This course examines the history of Latino populations in the United States since 1898: how Mexican American, Puerto Ricans, Cubans, and other Latino populations emerged, and how they responded to and reshaped the societies in which they lived. Much of the course focuses on the "facts" of history (e.g. the Latino experience during key moments in American History such as the Great Depression, World War II, the Civil Rights Movement, etc.) but the goal of the course is also to help students learn to assess evidence and conflicting interpretations.

Readings will draw from political, social and cultural history. (AM)

[HIST 2620 The Middle Ages: Introduction and Sampler # (CA-AS)

Summer and fall. 4 credits. Next offered 2011-2012. P. Hyams.]

HIST 2640 Introduction to Asian American History (also AAS 2130, AMST 2640) (HA-AS)

Fall. 4 credits. D. Chang.

An introductory history of Chinese, Japanese, Asian Indians, Filipinos, and Koreans in the United States from the mid-19th century to the 1990s. Major themes include racism and resistance, labor migration, community formation, imperialism, and struggles for equality. (AM)

[HIST 2650 Ancient Greece from Homer to Alexander the Great (also CLASS 2675) # (HA-AS)

Fall. 4 credits. Open to freshmen. Next offered 2010-2011. B. Strauss.]

[HIST 2660 Introduction to Native American History (also AIS/AMST 2660) (HA-AS)

Spring. 4 credits. Next offered 2010-2011. J. Parmenter.]

[HIST 2670 History of Rome I (also CLASS 2681) # (HA-AS)

Fall. 4 credits. Next offered 2010-2011. E. Rebillard.]

[HIST 2671 History of Rome II (also CLASS 2682) # (HA-AS)

Spring. 4 credits. HIST 2670 is not a prerequisite for HIST 2671. Next offered 2010-2011. E. Rebillard.]

HIST 2674 History of the Modern Middle East in the 19th-20th Century (also GOVT 2747, JWST/NES 2674) @ # (HA-AS)

Fall. 4 credits. Z. Fahmy.

For description, see NES 2674. (NE)

[HIST 2691 Holy War, Crusade, and Jihad in Judaism, Christianity, and Islam (also COML 2310, JWST/NES 2651) @ # (HA-AS)

Fall. 3 credits. Next offered 2010-2011. R. Brann.]

HIST 2699 History of the Ottoman Empire, 1300-1922 (also NES 2699)

Spring. 3 credits. A. Karakaya-Stump. For description, see NES 2699. (NE)

[HIST 2711 Politics of Violence in 20th-Century Europe (also GOVT 2716) (HA-AS)

Spring. 4 credits. Next offered 2010-2011. H. Case.]

HIST 2720 The Atlantic World from Conquest to Revolution (also AMST 2720) # (HA-AS)

Spring. 4 credits. M. B. Norton and R. Weil.

After Europeans first crossed the Atlantic in the late 15th century, the ocean became a vast highway linking Spain, France, Britain and the Netherlands to the Americas and Africa. In this course we will examine the lives of the men and women who inhabited this new world from the time of Columbus to the 18th century revolutions in Haiti and North America. Topics will include the destruction and reconfiguration of indigenous societies; slavery and other forms of servitude; the resistance, rebellion and accommodation of indigenous groups and slaves; religion; and the construction of gender, race and ethnicity.

Emphasis will be on reading and analyzing primary sources. (CO)

[HIST 2730 Women in American Society, Past and Present (also AMST/FGSS 2730) # (HA-AS)

Spring. 4 credits. Next offered 2010-2011. M. B. Norton.]

[HIST 2740 Foodways: A Social History of Food and Eating # (HA-AS)

Fall. 4 credits. Next offered 2010-2011. S. Kaplan.]

HIST 2744 Archaeology of Greek Private Life (also ARKEO/CLASS 2744, ARTH 2222) # (CA-AS)

Spring. 3 credits. K. Bowes.

For description, see CLASS 2744. (EA)

HIST 2750 History of Modern South Asia (also ASIAN 2275) @ # (HA-AS)

Fall. 4 credits. D. Ghosh.

This introductory course is a broad survey of the history of the Indian subcontinent from the end of the Mughal empire around 1700 to the present. This course is framed by two major transitions: from a Mughal government to British colonial government, and from colonialism to several postcolonial states. Prominent themes in the course include the emergence of religious and regional identities, ethnic violence, social reform and the "woman question," deindustrialization, and nationalism. Using primary sources and scholarly articles by a varied group of scholars, this course questions whether there is such a thing as one history of South Asia. (AS)

[HIST 2770 Getting Medieval I: The Early Middle Ages # (HA-AS)

Fall. 4 credits. Prerequisite for HIST 2771. Next offered 2010-2011. O. Falk.]

[HIST 2771 Getting Medieval II: The Age of Cathedral, Cartel, and Crossbow # (HA-AS)

Fall. 4 credits. Prerequisite: HIST 2620/HIST 2770 or permission of instructor. Next offered 2010-2011. O. Falk.]

HIST 2791 International Humanitarianism @ (HA-AS)

Spring. 4 credits. J. Weiss.

This course studies international humanitarian and human rights activities from their origins to the present. The ideological and social roots of humanitarian thought and action receive attention, as does the often-overlapping, sometimes conflictual relationship between humanitarianism and human rights advocacy. Case studies will include the anti-slavery movement, the activities of faith-based groups, biographical studies of pioneering individuals, and the international response to various genocides. (EM)

[HIST 2810 Science in Western Civilization: Medieval and Early Modern Europe up to Isaac Newton (also STS 2811) # (HA-AS)

Fall. 4 credits. HIST 2810 is not a prerequisite for HIST 2820. Next offered 2010-2011. P. Dear.]

HIST 2820 Science in Western Civilization: Newton to Darwin; Darwin to Einstein (also STS 2821) # (HA-AS)

Spring. 4 credits. HIST 2810 is not a prerequisite for HIST 2820. S. Seth.

This course aims to make comprehensible both to science majors and to students of the humanities the historical structure and development of modern science and to show

sciences as cultural phenomena. Changing perceptions of nature and human knowledge from Greek Antiquity to the 20th century form the framework for current Western views of the world, while the roots of the present-day dominance of "science" as a symbol of progress and modernity lie in an alliance between knowledge of nature and power over nature that took shape in the 19th century after a long period of emergence. This course covers the 18th, 19th, and early 20th centuries. (HS)

[HIST 2830 English History From Anglo-Saxon Times to 1485 # (HA-AS)]
Spring, 4 credits. Next offered 2012–2013.
P. Hyams.]

[HIST 2850 From Medievalism to Modernity: The History of Jews in Early Modern Europe, 1492 to 1789 # (HA-AS)]
Fall, 4 credits. Next offered 2010–2011.
V. Caron.]

[HIST 2861 History of Zionism and the Birth of Israel @ (HA-AS)]
Spring, 4 credits. Next offered 2011–2012.
V. Caron.]

HIST 2870 Evolution (also BIOEE 2070, STS 2871) (PBS)
Fall, 3 credits. W. Provine.
For description, see BIOEE 2070. (HS)

HIST 2880 Ancient Egyptian Civilization (also NES/JWST/ARKEO 2668) @ # (HA-AS)]
Spring, 3 credits. C. Monroe.
For description, see NES 2668. (NE)

[HIST 2890 The U.S.–Vietnam War (also ASIAN 2298) @ (HA-AS)]
Fall, 3 credits. Next offered 2011–2012.
F. Logevall.]

HIST 2891 Script and Culture in East Asia (also ASIAN 2209) @ # (LA-AS)]
Fall, 3 credits. B. Rusk.
For description, see ASIAN 2209. (AS)

HIST 2910 Modern European Jewish History, 1789 to 1948 (also JWST 2900, NES 2620) (HA-AS)]
Fall, 4 credits. S. Gutman.
Jewish life in Europe experienced a profound transformation as a result of the process of Jewish emancipation which began at the end of the 18th century. While emancipation offered Jews unprecedented social, economic and political opportunities, it also posed serious challenges to traditional Jewish life and values by making available new avenues of integration. This course will examine the ways in which Jewish and non-Jewish society responded to these new developments from the 18th century Enlightenment to the post-World War II era. Topics will include Jewish responses to emancipation, including assimilation and new varieties of religious accommodation; the development of modern antisemitism; the rise of Zionism and the creation of the state of Israel; the modernization of Eastern European Jewry; the impact of mass immigration; and the Nazi era. (EM)

HIST 2920 Inventing an Information Society (also AMST/ECE/ENGRG 2980, STS 2921) (HA-AS)]
Spring, 3 credits. R. Kline.
For description, see ENGRG 2980. (AM)

[HIST 2940 History of China in Modern Times (also ASIAN 2294, CAPS 2940) @ (HA-AS)]
Fall, 4 credits. Next offered 2010–2011.
S. Cochran.]

[HIST 2960 East Asian Martial Arts (also ASIAN 2290) @ (HA-AS)]
Fall, 4 credits. Next offered 2011–2012.
T. J. Hinrichs.]

HIST 2970 Imperial Russia: Peter the Great to the Revolution of 1917 # (HA-AS)]
Fall, 4 credits. C. Verhoeven.
This course surveys the history of Imperial Russia, with an emphasis on the empire's recurrent experience of revolutionary change in the political, socioeconomic, and cultural spheres. Topics include such remodeling projects as Peter the Great's westernization and Alexander II's "Great Reforms"; military upheavals like 1812, 19th-century imperialist warfare, the Revolution of 1905, World War I, and the Revolution of 1917; late, and therefore very rapid industrialization and urbanization; and the attempts by successive generations of rebels and revolutionaries to put their political theory into practice. A good deal of class readings will be drawn from Russia's rich literary heritage, especially its "golden age" (e.g., Tolstoy, Dostoevsky). (EM)

[HIST 2971 Politics, Culture, and Society in Early Modern Europe, 1450–1789 # (HA-AS)]
Fall, 4 credits. Next offered 2010–2011.
D. Corpis.]

[HIST 2981 Power, Culture, and Heterogeneity in Premodern Japan, 1200–1800 (also ASIAN 2295) @ # (HA-AS)]
Fall, 4 credits. Next offered 2010–2011.
K. Hirano.]

HIST 3002 Supervised Research
Fall and spring, 3 or 4 credits. Prerequisite: junior or senior standing. Permission of instructor required. Staff. (HR)

[HIST 3030 African–American Women in Slavery and Freedom (also AMST 3030, FGSS 3070) # (HA-AS)]
Spring, 4 credits. Letter grades only. Next offered 2010–2011. M. Washington.]

[HIST 3050 Britain, 1660 to 1815 # (HA-AS)]
Fall, 4 credits. Next offered 2010–2011.
R. Weil.]

HIST 3051 Milton and the English Revolution (also ENGL 3290) # (LA-AS)]
Fall, 4 credits. R. Weil and R. Kalas.
For description, see ENGL 3290. (EM)

[HIST 3060 Modern Mexico: From Independence to the Zapatistas @ (HA-AS)]
Spring, 4 credits. Next offered 2010–2011.
R. Craib.]

[HIST 3070 British History, 1760–1870 # (HA-AS)]
Fall, 4 credits. Next offered 2010–2011.
T. R. Travers.]

[HIST 3080 History of Post-War Germany (1945 to Present) (HA-AS)]
Fall, 4 credits. Next offered 2011–2012.
I. Hull.]

[HIST 3090 History and Geographical Imagination @ # (HA-AS)]
Fall, 4 credits. Next offered 2011–2012.
R. Craib.]

[HIST 3101 British History, 1870–Present (HA-AS)]
Spring, 4 credits. Next offered 2010–2011.
T. R. Travers.]

[HIST 3130 U.S. Foreign Relations, 1750–1912 (also AMST 3130) # (HA-AS)]
Fall, 4 credits. Next offered 2010–2011.
F. Logevall.]

HIST 3140 History of American Foreign Policy, 1912 to the Present (also AMST/CAPS 3140) (HA-AS)]
Spring, 4 credits. F. Logevall.
Students examine the emergence of the United States as a world power in the 20th century. The course focuses on the domestic sources of foreign policy and the assumptions of the major policy makers (Wilson through Clinton). Important themes include the American response to a revolutionary world since 1912, the role of American racial values in the making of foreign policy, and the increasingly dominant role of the president in the making of U.S. foreign policy. (AM)

HIST 3150 Environmental History: The United States and Beyond (also AMST 3150) # (HA-AS)]
Spring, 4 credits. A. Sachs.
This lecture course serves as an introduction to the historical study of humanity's interrelationship with the natural world. Environmental history is a relatively new and quickly evolving field, taking on increasing importance as the environment itself becomes increasingly important in world affairs. During this semester, we'll examine the sometimes unexpected ways in which "natural" forces have shaped human history (the role of germs, for instance, in the colonization of North America); the ways in which human beings have shaped the natural world (through agriculture, urbanization, and industrialization, as well as the formation of things like wildlife preserves); and the ways in which cultural, scientific, political, and philosophical attitudes toward the environment have changed over time. This is designed as an intensely interdisciplinary course: we'll view history through the lenses of ecology, literature, art, film, law, anthropology, and geography. Our focus will be on the United States, but, just as environmental pollutants cross borders, so too will this class, especially toward the end, when we attempt to put U.S. environmental history into a geopolitical context. (AM)

HIST 3160 American Political Thought: From Madison to Malcolm X (also AMST/GOVT 3665) # (HA-AS)]
Fall, 4 credits. I. Kramnick.
For description, see GOVT 3665. (AM)

[HIST 3170 British–French North America (also AMST 3170) # (HA-AS)]
Fall, 4 credits. Next offered 2010–2011.
J. Parmenter.]

[HIST 3180 American Constitutional Development (also AMST 3180) (HA-AS)]

Fall. 4 credits. Not open to freshmen. Next offered 2010-2011. R. Polenberg.]

[HIST 3191 Martial Arts and Society and Religion (also ASIAN 3391) @ (HA-AS)]

Fall. 4 credits. Next offered 2011-2012. T. J. Hinrichs.]

[HIST 3200 The Viking Age # (HA-AS)]

Spring. 4 credits. Next offered 2010-2011. O. Falk.]

[HIST 3210 Colonial North America to 1763 (also AMST 3210) # (HA-AS)]

Fall. 4 credits. Next offered 2010-2011. M. B. Norton.]

[HIST 3240 Varieties of American Dissent, 1880-1900 (also AMST 3240) (HA-AS)]

Spring. 4 credits. Next offered 2011-2012. N. Salvatore.]

[HIST 3250 Age of the American Revolution, 1754 to 1815 (also AMST 3250) # (HA-AS)]

Spring. 4 credits. Next offered 2010-2011. M. B. Norton.]

[HIST 3251 History of the Family in the U.S. (also AMST/FGSS 3251) (HA-AS)]

Spring. 4 credits. T. Carroll.

The family is at the center of contemporary political debates involving social policies, gender roles, citizenship, marriage, and the role of the state. Politicians and commentators frequently invoke a mythical American family, one that is conflict-free, independent, and unchanging. These idealized depictions mask a far more complicated and richer historical reality of the development of family structures in the U.S. This course will examine both the diverse experiences of actual families in the American past, and changing ideologies about the family and its social role. We will examine in particular immigration, reproduction and childrearing, sexuality, work, leisure, and consumption. We will maintain a sustained focus on changing constructions of race, ethnicity, gender and class and the interactions of these social relations with social structures including the labor and housing markets, immigration and naturalization law, and the educational system. Through this exploration, we will see both how social structures including the family shaped individuals' experiences, and how historical actors responded to and changed these structures. We will also gain a better understanding of what's at stake in today's debates about the family, and will conclude by asking how contemporary social policies could better address the needs of all families. Students will have the opportunity to write a family history of their own, or to complete an alternative research assignment. (AM)

[HIST 3260 History of the Modern British Empire (HA-AS)]

Fall. 4 credits. T. R. Travers.

A survey of British imperial history from the late 18th century until the period after World War II. Major themes include: the causes of imperial expansion, ideologies of empire, the nature of imperial power, the relationship between imperialism and globalization, and the process of decolonization. Using essays, diaries, newspapers, fiction, and film, students seek to understand both the experiences of particular colonies and the consequences of empire for Britain itself. (EM)

[HIST 3270 The Old South (also AMST 3270) # (HA-AS)]

Spring. 4 credits. Next offered 2011-2012. E. Baptist.]

[HIST 3280 Construction of Modern Japan (also ASIAN 3328) @ # (HA-AS)]

Spring. 4 credits. Next offered 2010-2011. J. V. Koschmann.]

[HIST 3290 Physical Sciences in the Modern Age (also STS 3301) (HA-AS)]

Fall. 4 credits. S. Seth.

For description, see STS 3301. (HS)

[HIST 3300 Japan from War to Prosperity (also ASIAN 3335) @ (HA-AS)]

Spring. 4 credits. Next offered 2011-2012. J. V. Koschmann.]

[HIST 3303 History and Popular Culture in Africa (also ASRC 3303)]

Spring. 3 credits. J. Byfield.

For description, see ASRC 3303. (AF)

[HIST 3304 African American History: From the Age of Booker T. Washington to the Age of Barack Obama (also ASRC 3304)]

Spring. 3 credits. R. Harris.

For description, see ASRC 3304. (AF)

[HIST 3310 Causes of the American Civil War, 1815 to 1860 (also AMST 3310) # (HA-AS)]

Fall. 4 credits. Next offered 2011-2012.

E. Baptist.]

[HIST 3340 19th-Century European Culture and Intellectual History (HA-AS)]

Fall. 4 credits. Next offered 2010-2011.

C. Robcis.]

[HIST 3341 20th-Century European Culture and Intellectual History (HA-AS)]

Spring. 4 credits. Next offered 2010-2011.

C. Robcis.]

[HIST 3391 Seminar on American Relations with China (also ASIAN 3305, CAPS 3000) (HA-AS)]

Fall. 4 credits. Offered in the Cornell in Washington Program. R. Bush.

For description, see CAPS 3000. (AM) (AS)

[HIST 3400 Recent American History, 1925 to 1965 (also AMST 3400) (HA-AS)]

Fall. 4 credits. Not open to freshmen. Next offered 2011-2012. R. Vanderlan.]

[HIST 3410 Recent American History, 1965 to the Present (also AMST 3410) (HA-AS)]

Spring. 4 credits. Next offered 2011-2012. Staff.]

[HIST 3420 History of Modern South Asia, 1700 to 1947: From the Mughals to Midnight (also ASIAN 3342) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010-2011.

D. Ghosh.]

[HIST 3430 American Civil War and Reconstruction, 1860 to 1877 (also AMST 3430) # (HA-AS)]

Fall. 4 credits. E. Baptist.

A survey of the turning point of U.S. history: The Civil War (1861-1865) and its aftermath, Reconstruction (1865-1877). We will look at the causes, the coming, and the conduct, of the war, and the way in which it became a war for freedom. We will then follow the cause of freedom through the greatest slave

rebellion in American history, and the attempts by formerly enslaved people to make freedom real in Reconstruction. And we will see how Reconstruction's tragic ending left questions open that are still not answered in U.S. society and politics. (AM)

[HIST 3431 Obama and Lincoln (also AMST 3431) (HA-AS)]

Fall. 4 credits. E. Baptist.

Constant comparisons link the x and y presidents of the U.S., Abraham Lincoln and Barack Obama. This course will use the histories of the eras in which the two became president, and their administrations (in the case of Obama, his administration so far) in order to teach students about the following topics: the history of American political campaigns, the history the American party system, the uses of American political rhetoric in the speeches and texts of two acknowledged masters of the genre, the question of how we measure ethics in politics and the presidency, the role of race and the history of slavery in the context of American national self-definition, and the changing history of the presidency itself. (AM)

[HIST 3440 South Asia and the Early Modern World (also ASIAN 3369) @ # (HA-AS)]

Spring. 4 credits. Next offered 2011-2012.

D. Ghosh.]

[HIST 3450 Cultural and Intellectual Life of 19th-Century Americans (also AMST 3450) # (HA-AS)]

Fall. 4 credits. Next offered 2010-2011.

A. Sachs.]

[HIST 3460 The Modernization of the American Mind (also AMST/RELST 3460) (HA-AS)]

Fall. 4 credits. R. L. Moore.

American thought and culture from 1890 to the present. Emphasizes the intellectual impact of major political and economic events and the adaptation of social ideas and values to new conditions. (AM)

[HIST 3470 Asian American Women's History (also AAS/AMST/FGSS 3470) (CA-AS)]

Spring. 4 credits. D. Chang.

This course examines the experiences and representations of Asian American women from the mid-19th century to the present. It explores the lives and contexts of immigrant women and of women both in the U.S. questions of identity and power are at the heart of this course as we explore the intertwined nature of race, gender, and nation. (AM)

[HIST 3481 Modern France: 1870 to the Present (HA-AS)]

Spring. 4 credits. Next offered 2011-2012.

C. Robcis.]

[HIST 3490 Renaissance England, 1485 to 1660 # (HA-AS)]

Fall. 4 credits. Next offered 2011-2012.

R. Weil.]

[HIST 3500 The Italian Renaissance # (HA-AS)]

Spring. 4 credits. Next offered 2010-2011.

J. Najemy.]

[HIST 3510 Machiavelli # (HA-AS)]

Fall. 4 credits. Next offered 2010-2011.

J. Najemy.]

[HIST 3520 20th-Century East Asian-American Relations (also CAPS 3520) @ (HA-AS)
Spring. 4 credits. Next offered 2010–2011.
J. Chen.]

[HIST 3560 The Era of the French Revolution and Napoleon # (HA-AS)
Fall. 4 credits. Next offered 2010–2011.
S. Kaplan.]

[HIST 3570 Constructing State and Civil Society: Germany 1648–1870 # (HA-AS)
Fall. 4 credits. Next offered 2011–2012.
I. Hull.]

[HIST 3580 Survey of German History, 1890 to the Present (HA-AS)
Spring. 4 credits. For freshmen, permission of instructor required. Next offered 2011–2012.
I. Hull.]

[HIST 3611 Bakumatsu-Ishin: Conflicts and Transformations in Early Modern Japan, 1700–1890 (also ASIAN 3611) @ (HA-AS)
Fall. 4 credits. Next offered 2011–2012.
K. Hirano.]

[HIST 3619 Near Eastern Christianities, 50–650 CE (also NES/JWST/RELST 3619) @ # (HA-AS)
Spring. 4 credits. Next offered 2010–2011.
K. Haines-Eitzen.]

HIST 3625 Christianization/Roman World (also CLASS 3625) @ # (HA-AS)
Fall. 4 credits. E. Rebillard.
For description, see CLASS 3625. (EA)

[HIST 3630 Archaeology, Ethics, and Nationalism (also ARKEO/CLASS 3730) # (CA-AS)
Spring. 3 credits. Next offered 2010–2011.
K. Bowes.]

[HIST 3631 History of Battle (HA-AS)
Spring. 4 credits. Next offered 2012–2013.
B. Strauss and E. Baptist.]

[HIST 3640 The Culture of the Renaissance II (also COML/FREN/RELST 3620, ENGL 3250, MUSIC 3242) # (CA-AS)
Fall. 4 credits. For freshmen, permission of instructor required. Next offered 2010–2011.
K. P. Long and W. Kennedy.]

[HIST 3644 Sages and Saints/Ancient World (also CLASS/RELST 3644) # (HA-AS)
Spring. 4 credits. Next offered 2010–2011.
E. Rebillard.]

HIST 3650 West Africa and the West: 1450–1850 (also ASRC 3302) # @ (HA-AS)
Fall. 4 credits. S. Greene.
1450 marks the time when peoples, ideas, material goods, and beliefs began to move on a regular basis across the Atlantic, first between Africa and Europe, and then later between Africa, North and South America, and the Caribbean. This course examines these movements and explores how West Africans managed their relations with the West over a 400-year period. (AF)

[HIST 3651 Law, Society, and Culture in the Middle East, 1200–1500 (also HIST 6651, NES 3551/6551) @ # (CA-AS)
Spring. 4 credits. Next offered 2010–2011.
D. Powers.]

[HIST 3661 History of Southern Africa (also ASRC 3661) @ (HA-AS)
Fall. 4 credits. Next offered 2011–2012.
D. Magaziner.]

HIST 3670 History of Modern Egypt (also NES 3670) @ (HA-AS)
Spring. 3 credits. Z. Fahmy.
For description, see NES 3670. (NE)

[HIST 3671 Survey of German History, 1648–1870 # (HA-AS)
Fall. 4 credits. For freshman, permission of instructor required. Next offered 2011–2012.
I. Hull.]

HIST 3677 Search for the Historical Muhammad (also NES 3677)
Spring. 4 credits. D. Powers.
For description, see NES 3677. (NE)

[HIST 3680 Marriage and Sexuality in Medieval Europe (also FGSS 3680) # (HA-AS)
Fall. 4 credits. Recommended: some prior knowledge of medieval European history. Next offered 2010–2011.
P. Hyams.]

[HIST 3690 The History of Florence in the Time of the Republic, 1250 to 1530 # (HA-AS)
Spring. 4 credits. Next offered 2010–2011.
J. Najemy.]

HIST 3700 History of the Holocaust (also JWST 3700) (HA-AS)
Spring. 4 credits. V. Caron.

This course will analyze the meaning of the Holocaust from three vantage points: that of European history; that of Jewish history; and that of those states and religious institutions that shared responsibility by having stood by in silence. Topics include: the evolution of modern anti-Semitism, the role of anti-Semitism in the Nazi ideology and program; the bureaucratization of death; Jewish life in ghettos and concentration camps; the fate of Jews in occupied Europe and the question of collaboration; Jewish political behavior under duress; the responses of the Western allies and the Churches; contemporary interpretations of the Holocaust and the meaning of evil. (EM)

HIST 3710 World War II in Europe (HA-AS)

Summer and fall. 4 credits. J. Weiss.
The Second World War remains the single most important set of events shaping the contemporary world. The course deals with both the events of World War II as they shaped European and world history and the way those events were remembered and commemorated in postwar years. Lectures, screenings, and readings will examine: the role of wartime political leaders and military commanders; the experience of war and occupation for soldiers and civilians, including Resistance movements and collaborators; Nazi genocide; intellectual and cultural changes during the war, including the impact on literature and philosophy; strategic questions about the origins and conduct of the war; the concluding phases involving the Nuremberg Trials, the Yalta and Potsdam conferences, and the launching of the Cold War; and the representation of the war in subsequent films, literature, and political culture. (EM)

[HIST 3730 Law, Crime, and Society in Early Modern Europe # (HA-AS)
Spring. 4 credits. Next offered 2011–2012.
D. Corpiis.]

HIST 3731 Religion and Society in Early Modern Europe (also RELST 3731) (HA-AS)

Spring. 4 credits. D. Corpiis.
European Christendom both exploded and imploded in the 16th century, creating a fragmented and fractious religious landscape that still marks Europe to this day. This course examines the significant changes brought about by the Protestant and Catholic Reformations and explores the impact of new religious dogmas, beliefs, practices, and institutions upon the broader order of European politics, society, and culture. Topics covered will include: the thought of Luther and Calvin, the Anabaptists, the Peasants' War, the responses of the Catholic Church, the changes in women's piety, heresy and witchcraft, and the Wars of Religion, and Christianity's encounters with Judaism and Islam. (EM)

[HIST 3750 The African American Workers, 1865 to 1910: The Rural and Urban Experience (also ILCRB 3850) # (HA-AS)

Fall. 3 credits. Junior or senior standing or permission of instructor. Next offered 2010–2011.
N. Salvatore.]

[HIST 3760 The African-American Workers, 1910 to the Present: Race, Work, and the City (also ILCRB 3860)
Fall. 3 credits. Next offered 2011–2012.
N. Salvatore.]

[HIST 3780 Topics in U.S. Women's History (also AMST 3708)
Fall. 4 credits. Prerequisite: FGSS/HIST 2730 or 3030, or permission of instructor. Next offered 2011–2012.
M. B. Norton.]

HIST 3790 The First World War: Causes, Conduct, Consequences (HA-AS)
Spring. 4 credits. Open to freshmen.
I. Hull.

This course examines the long-term and immediate political, social, and cultural causes of World War I, its catastrophic prosecution, and its revolutionary consequences. Recurring themes are: the building of nation-states, the diplomatic and military systems of the 19th and 20th centuries, mass mobilization, the development of mass violence, and the emergence of millenarian visions of the future. (EM)

[HIST 3840 Europe and Early Cold War (HA-AS)
Fall. 4 credits. Next offered 2011–2012.
J. Weiss.]

HIST 3860 The Indian Ocean in World History @ (HA-AS)
Fall. 4 credits. S. Aslanian.

The purpose of this course is to introduce students to the rapidly growing field of Indian Ocean studies. Our approach will be to study the Indian Ocean as one of the oldest maritime highways connecting diverse regions, cultures and "civilizations." The time period for the course will roughly coincide with the emergence of Islam in the seventh century CE to the intrusion of various European powers into the region and the subsequent emergence of the global economy and colonialism in the 19th century. In studying the Indian Ocean "world" within the framework of global history, particular attention will be paid to the role of port cities and their networks and especially to a variety of seaborne long-distance merchant communities (Geniza Jews, Muslims, Julfan Armenians, and Indians) that

facilitated the circulation of commodities, cultures, and ideas and in doing so helped to give shape to the Indian Ocean as a "unified" aquatic space in world history. We will rely on a variety of texts including primary sources such as travel literature, scholarly studies of the economic history of merchant communities, as well as Amitav Ghosh's extraordinary novel of medieval life in the Indian Ocean, entitled *In an Antique Land*. The format of the course will be lecture and discussion. Students are strongly urged to begin reading *In an Antique Land* from the first week of class. (AS)

[HIST 3880 History of Vietnam (also ASIAN 3385/6685, HIST 6880) @ # (HA-AS)]

Fall. 3 credits. Next offered 2010-2011. K. Taylor.]

[HIST 3950 Premodern Southeast Asia (also ASIAN 3397, HIST 6950) @ # (HA-AS)]

Fall. 4 credits. Open to undergraduates, both majors and nonmajors in history, and to graduate students, although with separate requirements. Next offered 2010-2011. E. Tagliacozzo.]

[HIST 3960 Southeast Asian History from the 18th Century (also ASIAN 3396/6696, HIST 6960) @ (HA-AS)]

Spring. 4 credits. Graduate students must enroll in HIST 6960. E. Tagliacozzo.

Surveys the modern history of Southeast Asia with special attentions to colonialism, the Chinese diaspora, and sociocultural institutions. Considers global transformations that brought "the West" into people's lives in Southeast Asia. Focuses on the development of the modern nation-state, but also questions the narrative by incorporating groups that are typically excluded. Assigns primary texts in translation. (AS)

[HIST 3970 History of the Israeli-Palestinian Conflict (also GOVT 3977, JWST/NES 3697, SOC 3970) @ (HA-AS)]

Spring. 4 credits. R. Brann. For description, see NES 3697. (NE)

Honors Courses

[HIST 4000 Honors Proseminar]

Fall and spring. 4 credits. Limited to 15 students. For prospective honors candidates in history. Permission of member of Honors Committee required. Fall, L. Moore; spring, D. Ghosh.

An exploration of major contemporary approaches to historical inquiry, analysis, and presentation. Ways of thinking about history along with research methods and organization of the results will be considered by reading and discussing a variety of historical works. (HR)

[HIST 4001 Honors Guidance]

Fall. 4 credits. Prerequisite: HIST 4000. Permission of instructor required. M. B. Norton. (HR)

[HIST 4002 Honors Research]

Spring. 4 credits. Prerequisite: HIST 4000. Permission of instructor required. M. B. Norton. (HR)

Undergraduate Seminars

[HIST 4030 History of the U.S. Senate in the 20th Century (also GOVT 4218) (HA-AS)]

Fall and spring. 4 credits. Offered in Cornell in Washington Program. B. Koed. This course will offer students an opportunity to view the process of shaping national debates from the perspective of the United States Senate. The modern Senate will serve as the point of reference for an inquiry into the development of the institution's powers under the Constitution during the past 200 years. Class readings, lectures and discussions will focus on the themes of continuity and change, the role of individual senators, and the institutional evolution of the Senate. In addition to general class reading and written examinations, each student will write a short paper and participate in an oral presentation. (AM)

[HIST 4050 U.S.-Cuba Relations (also AMST/LATA/LSP 4050/6050, HIST 6050) (HA-AS)]

Spring. 4 credits. Next offered 2010-2011. M. C. García.]

[HIST 4061 The New Cold War History (also HIST 6061) @ (HA-AS)]

Spring. 4 credits. Limited to 15 students. Next offered 2011-2012. J. Chen.]

[HIST 4070 History/Memory of Asia-Pacific War (also ASIAN 4426) @ (HA-AS)]

Spring. 4 credits. Next offered 2012-2013. J. V. Koschmann.]

[HIST 4080 Feudalism and Chivalry: Secular Culture in Medieval France, 1000 to 1300 # (HA-AS)]

Fall. 4 credits. Recommended: HIST 2620. Next offered 2010-2011. P. Hyams.]

[HIST 4091 Contesting Identities in Modern Egypt (also NES 4605) @ (HA-AS)]

Fall. 4 credits. Next offered 2010-2011. Z. Fahmy.]

[HIST 4100 Archipelago: Worlds of Indonesia (also ASIAN 4409/6617, HIST 6100) @ (HA-AS)]

Spring. 4 credits. Open to undergraduates and graduate students, though with separate requirements. Limited to 15 students. Next offered 2010-2011. E. Tagliacozzo.]

[HIST 4111 Undergraduate Seminar: History of the American South (also AMST 4302) (HA-AS)]

Fall. 4 credits. Next offered 2010-2011. E. Baptist.]

[HIST 4120 The Scientific Revolution in Early-Modern Europe (also STS 4120) (HA-AS)]

Spring. 4 credits. Next offered 2011-2012. P. Dear.]

[HIST 4141 Women's Activism and Social Change in the 20th Century U.S. (also AMST/FGSS 4141) (HA-AS)]

Fall. 4 credits. T. Carroll. This is a service-learning course in which students will examine women's leadership in movements for social change, and lead their own study groups on the same topic with young people in local prisons. During the term, we will examine activists from a variety of movements including those mobilizing on issues relating to economic justice, race

relations, sexual identity, peace, gender equality, public health, and social welfare. We will focus on the tactics and the strategies, as well as the successes and failures, of social movements in the 20th-century United States. We will both study and practice consciousness-raising and group education as methods of social change, and emphasize the relationship between activists' intellectual contributions and their community engagement. At the start of the semester, students will receive training in leading small-group discussions. Students will meet weekly outside of class in groups of three to four to plan activities for their study group, and must reserve Thursdays from 2:15 to 4:30 to travel to local institutions to meet with their study groups. Students eligible for work study may count their service hours toward their work study requirements. In addition to the service requirements, students must complete assigned readings, keep a weekly reflection journal, and complete a group final presentation analyzing and evaluating their experience over the semester. (AM)

[HIST 4150 Seminar in the History of Biology (also BIOEE 4670, BSOC/STS 4471) (PBS)]

Summer or fall. 4 credits. Limited to 18 students. W. Provine. For description, see BIOEE 4670. (HS)

[HIST 4160 Undergraduate Seminar on Gender and Sexuality in Southeast Asia (also ASIAN 4416/6618, FGSS 4160, HIST 6160) @ (CA-AS)]

Fall. 4 credits. Letter grades only. Next offered 2011-2012. T. Loos.]

[HIST 4170 History of Jews in Modern France (also FREN 4130, JWST 4170) (HA-AS)]

Spring. 4 credits. Permission of instructor required. V. Caron.

This course will explore the integration of Jews into French society from the French Revolution to the present. Topics will include: the debate over Jewish emancipation during the Enlightenment, the French Revolution, and the Napoleonic era; the processes of religious and social assimilation; the rise of antisemitism and the Dreyfus Affair; Jewish responses to antisemitism; the immigrant challenge and refugee crisis of the 1930's; the Vichy era and Jewish resistance during World War II; and the reconstruction of the French Jewish community since 1945. (EM)

[HIST 4200 Asian American Communities (also AAS 4240, AMST 4200) (HA-AS)]

Spring. 4 credits. Limited to 15 students. Next offered 2010-2011. D. Chang.]

[HIST 4221 British in India, 1750-1830 @ # (HA-AS)]

Spring. 4 credits. Next offered 2011-2012. T. R. Travers.]

[HIST 4231 Gender and Technology (also BSOC/FGSS/STS 4231) (HA-AS)]

Spring. 4 credits. S. Pritchard. For description, see STS 4231. (HS)

[HIST 4251 Ethics, Race, Religion, and Health Policy (HA-AS)]

Fall. 4 credits. Offered in Cornell in Washington Program. A. Kraut. (AM)

[HIST 4260 The West and Beyond: Frontiers and Borders in American History and Culture (also AMST 4260) (HA-AS)

Spring. 4 credits. Limited to 15 students. Priority given to junior and senior majors in History and American Studies. Next offered 2010–2011. A. Sachs.]

HIST 4261 Commodification and Consumerism in Historical Perspective: Sex, Rugs, Salt, and Coal (also AMST 4261) @ # (HA-AS)

Fall. 4 credits. Priority given to juniors and seniors majoring in history and American studies. A. Sachs.

Everything is for sale today—but has it always been? We'll look at the history of various commodities to explore the changing cultural and environmental impacts of market forces. Why are "oriental" rugs collector's items? How did we come to keep salt shakers on our dinner tables? When did coal start replacing wood as a fuel source? This course will cross multiple boundaries of time and space as it examines both case studies and broader theoretical perspectives, allowing us to draw connections between our culture of consumption and the social forces wrapped up in production. How was the taste for sugar linked to the slave trade? Is prostitution really "the oldest profession"? What goes into your daily cup of coffee besides half and half? And what was western society like before everything had a price? (AM)

[HIST 4270 Reading the Africa Diaspora (HA-AS)

Spring. 4 credits. Next offered 2011–2012. D. Magaziner.]

HIST 4271 African Environmental History (also ASRC 4305) @ (HA-AS)

Fall. 4 credits. D. Magaziner.

This course offers systematic and in depth analysis of issues and themes related to the environmental history of sub-Saharan Africa. Students read a variety of scholarly and popular writing about topics such as African agricultural and wildlife management practices, nature, landscape and conflicts over conservation during the colonial and post-colonial era, and the politics and social history of famine, ecological crisis and disease. The course's seminar format allows students to develop their own areas of interest and, in addition to the reading, students will be responsible for informed class discussion and one substantial paper over the course of the semester. (AF)

[HIST 4280 Freud and His Commentators (also GERST 4270) (HA-AS)

Fall. 4 credits. Next offered 2011–2012. C. Robcis.]

[HIST 4300 America in the Camera's Eye (also AMST 4302)

Fall. 4 credits. Limited to 15 students. Permission of instructor required. Next offered 2011–2012. R. L. Moore.]

HIST 4301 Black Leaders and Movements in African American History (also ASRC 4301)

Spring. 3 credits. R. Harris.

For description, see ASRC 4301. (AF)

[HIST 4310 Migrant Workers (also CRP 3850/5850, HIST 6310, ILRCB 4020, LSP 4310/6310) (HA-AS)

Spring. 4 credits. Next offered 2010–2011. R. Craib.]

[HIST 4311 Topics in American Studies: American Politics and Dissent, 1945–2000 (also AMST 4310)

Fall. 4 credits. Next offered 2011–2012. N. Salvatore.]

[HIST 4320 Topics in Ancient Greek History (also CLASS 4320, HIST 6330)

Spring. 4 credits. Next offered 2011–2012. B. Strauss.]

[HIST 4330 History of Modern German Jewry: From Enlightenment to the Post-1945 Era (also JWST 4330) (HA-AS)

Spring. 4 credits. Limited to 15 students. Next offered 2011–2012. V. Caron.]

[HIST 4360 Conflict Resolution in Medieval Europe # (KCM-AS)

Spring. 4 credits. Next offered 2010–2011. P. Hyams.]

HIST 4390 Reconstruction and the New South (also AMST 4390, HIST 6391) # (HA-AS)

Fall. 4 credits. Limited to 15 students. Limited to juniors and seniors. M. Washington.

This course focuses on the American South in the 19th century as it made the transition from Reconstruction to new forms of social organization and patterns of race relations. Reconstruction will be considered from a sociopolitical perspective, concentrating on the experiences of the freed people. The New South emphasis will include topics on labor relations, economic and political changes, new cultural alliances, the rise of agrarianism, and legalization of Jim Crow. (AM)

HIST 4400 Undergraduate Seminar in Recent American History (also AMST 4400) (HA-AS)

Fall. 4 credits. Permission of instructor required. R. Polenberg.

Topic: The Blues and American Culture (AM)

[HIST 4411 Fourth-Century and Early History of Greece (also CLASS 4410) # (HA-AS)

Fall. 4 credits. Next offered 2011–2012. B. Strauss.]

HIST 4421 To Be Enslaved Then and Now (also ASRC 4306) # (HA-AS)

Spring. 4 credits. S. Greene.

In this course, we will read and analyze select texts (both oral and written) that were composed between the late 18th century and 2005 by individuals who were enslaved or who boasted of enslaving others. Emphasis is placed on African and African American texts but in comparison with narratives by Europeans, Asians and Latin Americans. For whom were these texts produced and for what purpose? How much in these texts is history, how much is fiction, and how do we determine the difference? What can these texts tell us about the individual authors and the political, economic and cultural contexts in which they were written? These and other related questions will structure this seminar. (AF)

[HIST 4440 American Men (also AMST/FGSS 4450) (HA-AS)

Fall. 4 credits. Limited to 15 students. Next offered 2010–2011. E. Baptist.]

HIST 4460 Strategy in World War II (HA-AS)

Spring. 4 credits. Permission of instructor required. J. Weiss.

Strategic decision-making in World War II. The course will be organized into a "task force" addressing crucial problems faced by the European–American Allies in World War II: the invasion of northwest Europe, strategic bombing tactics, the rescue of European Jews, and coordination with the Soviet Union. Individual presentations/papers followed by meetings to draft group reports. (EM)

[HIST 4470 Crusaders and Chroniclers @ # (HA-AS)

Fall. 4 credits. Limited to 15 students. Next offered 2011–2012. P. Hyams.]

[HIST 4501 Representing Atrocity: Questions of Historical Knowledge, Memory and Otherness in the Study of the Nanking Massacre Discourse (also ASIAN 4451)

Spring. 4 credits. Next offered 2011–2012. K. Hirano.]

HIST 4502 Power and Popular Culture in Early Modern Japan @ # (HA-AS)

Fall. 4 credits. K. Hirano.

How did the seemingly apolitical realm of popular culture become one of the grave political concerns of the Shogunate in early modern Japan? By investigating the complex interplay between power and popular culture, the course seeks to rethink the widely received conceptions of the political and the cultural, and to theorize the transformative process of Tokugawa society. (AS)

[HIST 4520 History of the New Europe (HA-AS)

Fall. 4 credits. Limited to 15 students. Next offered 2010–2011. H. Case.]

HIST 4552 The World of the Phoenicians (also NES/JWST 4550)

Spring. 4 credits. C. Monroe.

For description, see NES 4550. (NE)

[HIST 4560 Topics in Medieval Historiography (also HIST 6560) # (HA-AS)

Spring. 4 credits. Permission of instructor required. Next offered 2011–2012. O. Falk.]

[HIST 4570 Seminar in European Fascism (HA-AS)

Fall. 4 credits. Permission of instructor required. Next offered 2010–2011. I. Hull.]

[HIST 4581 Intelligibility in Science (also STS 4581) (HA-AS)

Spring. 4 credits. Next offered 2012–2013. P. Dear.]

[HIST 4601 Toward a Prehistory of Terrorism (HA-AS)

Fall. 4 credits. Next offered 2011–2012. O. Falk.]

HIST 4611 Religion and Imperial Politics in the Early Modern Middle East (also NES 4600) @ # (HA-AS)

Fall. 4 credits. A. Karakaya-Stump.

For description, see NES 4600. (NE)

[HIST 4621 The Enlightenment # (HA-AS)

Fall. 4 credits. Next offered 2011–2012. S. Kaplan.]

[HIST 4630 War and Society in Eastern Europe (HA-AS)

Spring. 4 credits. Next offered 2010–2011. H. Case.]

[HIST 4642 Women in the Modern Middle East (also FGSS 4640, NES 4642)

Spring. 4 credits. Next offered 2010-2011.
Z. Fahmy.]

HIST 4650 Special Topics: Historical Documents on Modern China (also CHIN 4426/6625, HIST 6650) @

Fall. 4 credits. Prerequisite: equivalent of three years Mandarin instruction.
Permission of instructor required. Z. Chen.
This course is designed to help graduate students and qualified undergraduate to conduct research on topics on modern Chinese history. To qualify to take the course, a student should have studied Chinese to the advanced level. It will concentrate on helping students develop the ability to read and interpret historical documents in Chinese. Altogether eight sets of original documents representing different events and periods are selected. Documentary films will also be shown in class to enhance students' understanding. While doing so, both linguistic and historical issues will be addressed and analyzed, so students will develop a better understanding of how to deal with some of the general challenges that they will be facing in conducting primary-source research on modern China. Class will be conducted in Chinese. (AS)

[HIST 4660 Iroquois History (also AIS/AMST 4660) # (HA-AS)

Fall. 4 credits. Next offered 2010-2011.
J. Parmenter.]

HIST 4666 Mass Media and identities in the Modern Middle East (also NES 4666)

Fall. 4 credits. Z. Fahmy.
For description, see NES 4666. (NE)

[HIST 4680 Love and Sex in the Italian Renaissance # (HA-AS)

Fall. 4 credits. Next offered 2011-2012.
J. Najemy.]

[HIST 4691 The Old English Laws and Their Politico-Cultural Context (also ENGL 4190, HIST 6691) # (CA-AS)

Fall. 4 credits. Next offered 2011-2012.
P. Hyams and T. Hill.]

HIST 4740 Topics in Modern European Intellectual and Cultural History: The Human and the Animal (also COML 4740, JWST 4674)

Fall. 4 credits. Limited to 15 students.
D. LaCapra.

The course will focus on the problem of the relations between history and literature. Of particular interest will be the attempt to negotiate the relations between formal "literary" analysis and historical understanding. Another key concern will be the types of critical theory most relevant to this attempt. Readings include Joseph Conrad, Gustave Flaubert, J. M. Coetzee, W. G. Sebald, M. M. Bakhtin, Fredric Jameson, Walter Benjamin, and Theodor Adorno. (EM)

[HIST 4741 Topics in Modern European Intellectual History: Trauma in Literature, History, and Film

Spring. 4 credits. Next offered 2011-2012.
D. LaCapra.]

[HIST 4760 History and Story in the Norse Sagas (also ENGL 4120, HIST 6760) (HA-AS)

Spring. 4 credits. Next offered 2010-2011.
O. Falk and T. Hill.]

[HIST 4821 Religious and Secular in American Culture (also AMST/RELST 4821) (HA-AS)

Fall. 4 credits. Permission of instructor required. Next offered 2011-2012.
R. L. Moore.]

HIST 4850 Immigration: History, Theory, and Practice (also AMST/LSP 4850) (HA-AS)

Fall. 4 credits. Permission of instructor required. M. C. Garcia.
This seminar focuses on immigration to the United States since 1965. We will examine the various groups that have migrated to the United States; the immigration and refugee policy that has facilitated their entry; contemporary debates about immigration control; the transnational ties of immigrants to their homelands; guest workers programs; and the special needs of today's immigrant populations. Course requirements include participation in a service-learning project within the Ithaca/Tompkins County area that will be arranged in conjunction with the professor. Weekly sessions will feature presentations by different Cornell faculty and representatives from local social agencies and community organizations. (AM)

HIST 4851 Refugees (also AMST/LSP 4851) (HA-AS)

Spring. 4 credits. Permission of instructor required. M. C. Garcia.
Since World War II, over four million people have migrated to the United States as refugees. In this seminar, we will examine some of these refugee migrations and the ways they challenged our understanding of the United States as a "haven for the oppressed." We will examine how refugee/asylum policy was crafted: the role of nongovernmental actors in influencing policy, and the ways it reflected foreign policy interests and security concerns. The second half will pay particular attention to our changing definitions of who "merits" asylum in the United States since the end of the Cold War. (AM)

[HIST 4861 Classics and Early America (also CLASS 4683, GOVT 4862) # (HA-AS)

Fall. 4 credits. Next offered 2010-2011.
H. Rawlings.]

[HIST 4870 Seminar on Thailand (also ASIAN 6601, HIST 6870) @ (HA-AS)

Spring. 4 credits. Next offered 2010-2011.
T. Loos and T. Chaloehtiarana.]

[HIST 4900 New World Encounters, 1500 to 1800 (also AIS/AMST 4900) (HA-AS)

Fall. 4 credits. Limited to 15 students. Next offered 2012-2013. J. Parmenter.]

[HIST 4910 Approaches to Medieval Violence (also HIST 6920) # (HA-AS)

Fall. 4 credits. Limited to 15 students.
Permission of instructor required. Next offered 2010-2011. O. Falk.]

[HIST 4921 India: Nation and Narration, History, and Literature (also ASIAN 4494) @ (CA-AS)

Spring. 4 credits. Next offered 2011-2012.
D. Ghosh and A. Banerjee.]

[HIST 4930 Problems in Modern Chinese History (also ASIAN 4493/6693, HIST 6930) @ (HA-AS)

Fall. 4 credits. Prerequisite: HIST 2940 or permission of instructor. Next offered 2010-2011. S. Cochran.]

HIST 4931 Vitality and Power in China (also ASIAN 4429, RELST/SHUM 4931, STS 4911)

Spring. 4 credits. T. J. Hinrichs.
Chinese discourses have long linked the circulation of cosmic energies, political power, and bodily vitalities. In these models political order, spiritual cultivation, and health are achieved and enhanced through harmonizing these flows across the levels of Heaven-and-Earth, state, and humankind. It is when these movements are blocked or out of synchrony that we find disordered climates, societies, and illness. In this course, we will examine the historical emergence and development of these models of politically resonant persons and bodily centered politics, reading across primary texts in translation from these otherwise often separated fields. For alternate frameworks of analysis as well as for comparative perspectives, we will also examine theories of power and embodiment from other cultures, including recent scholarship in anthropology and critical theory. (AS)

HIST 4932 The History of Reason (also SHUM 4932, STS 4921)

Spring. 4 credits. P. Dear.
This course will examine ways in which "reason" was understood, deployed, and contested in European thought and practice from the early-modern period through to the 20th century. We will read primary sources that theorize or employ notions of "reason" (Descartes, Hobbes, Newton, Hume, Kant, etc.) Theoretical controversy over the foundations of "reason" in political economy as well as in formal logic in the 19th century will also be studied, to counterpoint its practical uses in early anthropological work from the late 19th and 20th centuries on the notion of a "Great Divide" between western and nonwestern cultures. As well as regular weekly reports on the reading and active participation in discussion, students will be required to write a brief (2,000 word) midterm essay on one or more of the weekly readings, and a final paper (5,000 words) on a topic of their choice related to the themes of the course. (EM)

HIST 4933 Abolitionist Circuits (also ASRC/SHUM 4933, ENGL 4073)

Spring. 4 credits. M. Schoolman.
An interdisciplinary seminar drawing on literary, historical and geographical approaches to consider the roles of both physical transit and the geographic imaginary in 19th-century antislavery writing in English. Topics discussed will likely include the cross-border community of black activists living around the Great Lakes, the persistence of emigrationism throughout the antebellum period, abolitionist travel literature, and the historical existence and cultural deployment of the maroon communities in the Caribbean and the southern United States. Primary texts will include works by William Wells Brown, Mary Ann Shadd Cary, Martin Delany, Ralph Waldo Emerson, Joseph John Gurney, Herman Melville, James Redpath, Harriet Beecher Stowe, and Samuel Ringgold Ward, as well as the unique resources available through Cornell's Samuel Joseph May Collection of abolitionist pamphlets.

HIST 4950 Gender, Power, and Authority in England, 1600 to 1800 # (CA-AS)

Spring. 4 credits. R. Weil.

It is a truism that early modern society was a “patriarchal” one in which men had authority—but how did that authority operate and what were its limits? How did the exercise of power between men and women intersect with religious, literary, legal and political institutions? We will approach these questions chronologically, examining the impact of the Reformation, the English Revolution, the Enlightenment, the rise of middle class and polite culture. We will also explore them methodologically and generically, with an eye to how different kinds of evidence and sources can produce different kinds of conclusions. Historians’ hypotheses will be tested by analysis of primary sources. (EM)

[HIST 4961 History of Medicine and Healing in China (also ASIAN 4469, BSOC/STS 4961, HIST 6961) @ # (HA-AS)]

Spring. 4 credits. Next offered 2010–2011. T. J. Hinrichs.]

[HIST 4970 Jim Crow and Exclusion-Era America (also AAS 4970, AMST 4970/6970, HIST 6970) (HA-AS)]

Spring. 4 credits. Limited to 15 students. Next offered 2011–2012. D. Chang.]

[HIST 4990 Problems in Modern Chinese History (also ASIAN 4499/6694, HIST 6940) @ (HA-AS)]

Spring. 4 credits. Prerequisite: HIST 2940 or permission of instructor. Next offered 2011–2012. S. Cochran.]

HIST 4997 Undergraduate Research Seminar (also AMST 4997)

Fall and spring. 8 credits each semester. Offered in Cornell in Washington Program. S. Jackson.

Intensive research and writing experience using the extensive resources of Washington D.C. (AM)

Graduate Seminars

[HIST 5070 Graduate Seminar: The Occidental Tourist (also ASIAN 2206/5507, HIST 2070)]

Fall. 4 credits. Next offered 2010–2011. T. Loos.]

HIST 6000 Graduate Research Seminar

Spring. 4 credits. R. Craib.

This seminar is devoted entirely to the writing of a substantive research paper. Students will share research proposals, annotated bibliographies, outlines and portions of rough drafts. Class meetings will be devoted to discussing what students have produced, and general issues associated with constructing research papers. (HR)

HIST 6010 European History Colloquium

Fall and spring. 2 credits each semester. Limited to graduate students. Fall: D. LaCapra and J. Weiss; Spring: H. Case and C. Robcis.

A research colloquium designed for European history graduate students. The colloquium will offer a forum for students to present papers and to discuss the work of visiting scholars. (EM)

HIST 6020 East Asian Colloquium (also ASIAN 5599)

Fall and spring. 4 credits. K. Hirano.

A forum for graduate students to present their work and discuss the work of others. (AS)

HIST 6030 The Americas Colloquium

Fall and spring. 4 credits. Fall, E. Baptist; spring, staff.

A research colloquium designed for graduate students in U.S. and Latin American history. The colloquium will offer a forum for students to present papers and to discuss their work and that of occasional visiting scholars. (AM)

[HIST 6040 Colloquium in American History]

Spring. 4 credits. Requirement for first- and second-year graduate students in U.S. history. Next offered 2010–2011. E. Baptist.]

[HIST 6050 U.S.–Cuba Relations (also AMST/HIST/LSP 4050)]

Spring. 4 credits. Next offered 2010–2011. M. C. García.]

[HIST 6051 Themes and Issues in Modern European History]

Spring. 4 credits. Next offered 2011–2012. H. Case.]

[HIST 6061 The New Cold War History (also HIST 4061)]

Spring. 4 credits. Limited to 15 students. Next offered 2011–2012. J. Chen.]

[HIST 6100 Archipelago: Worlds of Indonesia (also ASIAN 4409/6617, HIST 4100)]

Spring. 4 credits. Limited to 15 students. Open to undergraduates and graduate students, although with separate requirements. Next offered 2010–2011. E. Tagliacozzo.]

[HIST 6101 Afro–American Historiography (also AMST 6101)]

Fall. 4 credits. Letter grades only. Next offered 2010–2011. M. Washington.]

[HIST 6102 Writing African–American History]

Fall. 4 credits. Next offered 2011–2012. M. Washington.]

[HIST 6110 Slavery in North America]

Spring. 4 credits. Next offered 2012–2013. M. Washington.]

HIST 6140 Readings in Cultural Materialism: Theory and Practice

Spring. 4 credits. K. Hirano.

The course is intended to be a forum where graduate students closely read and examine a set of scholarly works regarded collectively as the school of “Cultural Materialism.” During the 1970s and ’80s, a group of Marxism-inspired scholars began to suggest a way to overcome the old Marxist model of economic determinism by taking “culture” seriously as an integral part of materialist studies. This intellectual movement laid a foundation for what we currently call “Cultural Studies.” By revisiting their works, we will discuss what insights we can draw from them for our contemporary scholarly agendas and projects. The readings include *Lenin and Philosophy* (Althusser), *Prison Notebooks* (Gramsci), *Culture and Materialism* (Williams), *Marxism and Literature* (Williams), *Marxism and Philosophy of Language* (Volosinov), *Dialogic Imagination* (Bakhtin), *Postmodernism, or, The Cultural Logic of Late Capitalism* (Jameson), and others. (AS)

[HIST 6150 The Past in the Present/The Present in the Past: Histories of Tokugawa Japan (also ASIAN 6615)]

Fall. 4 credits. Next offered 2011–2012. K. Hirano.]

[HIST 6160 Gender and Sexuality in Southeast Asia (also ASIAN 4416/6618, FGSS/HIST 4160)]

Fall. 4 credits. Limited to 15 students. Intended for graduate students. Letter grades only. Next offered 2011–2012. T. Loos.]

[HIST 6180 Readings in 20th-Century U.S. Political, Intellectual, and Diplomatic History]

Fall. 4 credits. Prerequisite: graduate standing. Next offered 2011–2012. F. Logevall.]

[HIST 6200 Intelligibility in Science (also STS 6201)]

Spring. 4 credits. Graduate seminar. Next offered 2011–2012. P. Dear.]

[HIST 6230 Nation, Empire, and Identity in 17th-Century Historiography]

Fall. 4 credits. Next offered 2011–2012. R. Weil.]

[HIST 6231 The Intellectual History of Early Modern Empire]

Fall. 4 credits. Next offered 2010–2011. R. Weil.]

[HIST 6240 Culture, Commodities, and Capitalism in Europe, 1500–1800]

Spring. 4 credits. Next offered 2011–2012. D. Corpi.]

[HIST 6260 Graduate Seminar in the History of American Women]

Fall. 4 credits. Next offered 2011–2012. M. B. Norton.]

[HIST 6270 Graduate Seminar in Early American History]

Spring. 4 credits. Prerequisite: graduate standing. Permission of instructor required. Next offered 2010–2011. J. Parmenter.]

HIST 6280 Graduate Seminar: 19th-Century U.S. History

Spring. 4 credits. D. Chang.

This course will introduce students to the historiography of the 19th-century United States. We will investigate the period both thematically and chronologically. We will read, discuss, and critique works written from a variety of perspectives and using a number of different approaches. (AM)

HIST 6300 Topics in Ancient History (also CLASS 7682)

Spring. 4 credits. E. Rebillard.

For description, see CLASS 7682. (EA)

[HIST 6310 Migrant Workers (also CRP 3850/5850, HIST 4310, ILRCB 4020, LSP 4310/6310)]

Spring. 4 credits. Next offered 2010–2011. R. Craib.]

[HIST 6330 Topics in Ancient Greek History (also CLASS 4360/7684, HIST 4320)]

Spring. 4 credits. Next offered 2011–2012. B. Strauss.]

HIST 6350 The Writing of History

Spring. 4 credits. A. Sachs.

This graduate seminar approaches the writing of history as a problem rather than a given, as a craft or even an art rather than a standard method of presenting research. We’ll consider as many kinds of history writing as possible, including some that are more traditional and some that are more experimental. To get at the complexity of the problem, we’ll approach it from at least three distinct angles, examining the actual history of the writing of history

(going back to Herodotus, "The Father of Lies"); the theory and philosophy of the writing of history; and current writing practices. Readings will range widely through time and space and will be assessed not just for the quality of their arguments or their place in a given historiography but also for their success as pieces of writing. We'll discuss such topics as narrative structure, the role of the first person, tone, character development, and the basic use of language. Students will also be expected to do a fair amount of writing for this class and to share their papers in a workshop setting—though no new research will be required during the semester. Obviously, the course is geared toward students in the History department, but anyone doing historical writing in any discipline whatsoever—English, Science and Technology Studies, Sociology, etc.—is warmly invited to sign up. (AM)

[HIST 6360 Ancient Warfare (also CLASS 7686)]

Spring. 4 credits. Prerequisites: at least one course in ancient history and a reading knowledge of Greek and Latin. Permission of instructor required. Next offered 2010–2011. B. Strauss.]

HIST 6390 Mao and the Chinese Revolution

Fall. 4 credits. J. Chen.

This is a reading and research seminar designed to provide an in-depth investigation of one of the most magnificent, yet destructive, revolutions in human history—the Chinese Communist revolution, as well as the person who had shaped and led the revolution—Mao Zedong. The course develops in three phases. Phase I offers an introduction of Mao and the existing scholarship about Mao and his revolution. Phase II focuses on reading assignments of texts about Mao and by Mao. In Phase III, each student will write a comprehensive review essay on a Mao-related topic, and will orally present his or her own essay and, in addition, provide critique to a fellow student's essay and oral presentation. (AS)

HIST 6391 Reconstruction and the New South (also HIST/AMST 4390)

Fall. 4 credits. M. Washington.

For description, see HIST 4390. (AM)

HIST 6410 Science, Technology, Gender: Historical Issues (also FGSS 6400, STS 6401)

Spring. 4 credits. S. Seth.

For description, see STS 6401.

HIST 6411 Fourth-Century and Early Hellenistic History of Greece (also CLASS 7681)

Fall. 4 credits. B. Strauss.

Topics include the evolution of the Greek city-state; society, economy, and gender; democracy, oligarchy, and tyranny; the careers of Philip, Alexander, and the Successors. Greco-Persian relations. Sicily and southern Italy, and the establishment of the Hellenistic Kingdoms. (EA)

[HIST 6420 The Politics of History-Writing: Historiography and Post-Colonial Criticism of South Asia]

Spring. 4 credits. Next offered 2011–2012.

D. Ghosh.]

HIST 6481 Seminar in Latin American History

Fall. 4 credits. R. Craib.

Topic for Fall 2009: Peasants, Workers, and Intellectuals in Modern Latin America. This course is a readings and research seminar on the history of Spanish America from roughly 1750 to 2000, with particular attention to the post-independence histories of peasants, urban workers, and intellectuals. Weekly readings will include a major monograph on Latin America and particular theme (idea of peasant community; gender and labor; immigration and the social question; rise of the middle classes; politics of memory; the Left, among others) plus additional theoretical articles from various disciplines and fields that complement or challenge authors' conceptualizations of their material. As well as weekly participation and presentations, students will be expected to research and write a 25- to 30-page research paper based on primary sources. Reading knowledge of Spanish is helpful but not required. (LA)

HIST 6510 India and British Political Thought c. 1600–1850

Spring. 4 credits. T. R. Travers.

This seminar explores at how Britons who fought, traded, conquered and governed in early modern South Asia thought about their own actions, and also about the states and cultures they encountered. What did Britons think about the Mughal empire, and how did they understand and explain the rise of the British empire in India? What opportunities existed for intellectual exchanges between British and Indian political ideas in this period? In what ways did encounters with India feed back into British political thought? (EM)

HIST 6540 Topics in East-Central European History

Spring. 4 credits. H. Case.

Topic for Spring 2010: War in Modern East-Central European History. (EM)

[HIST 6550 Early Modern Atlantic World (also AMST 6550)]

Spring. 4 credits. Next offered 2010–2011.

M. B. Norton.]

[HIST 6560 Topics in Medieval Historiography (also HIST 4560)]

Spring. 4 credits. Permission of instructor required. Next offered 2011–2012. O. Falk.]

[HIST 6610 Graduate Seminar in 20th-Century German History]

Fall. 4 credits. Permission of instructor required. Next offered 2010–2011. I. Hull.]

[HIST 6641 Medieval Poverty]

Fall. 4 credits. Next offered 2010–2011.

P. Hyams.]

HIST 6650 Historical Documents on Modern China (also CHIN 4426/6626, HIST 4650)

Fall. 4 credits. Prerequisite: equivalent of three years Mandarin instruction.

Permission of instructor required. Z. Chen. For description, see HIST 4650. (AS)

[HIST 6651 Law, Society, and Culture in the Middle East, 1200–1500 (also HIST/NES 3651/6651)]

Spring. 4 credits. Next offered 2010–2011.

D. Powers.]

[HIST 6671 Spartacus (also CLASS 7667)]

Spring. 4 credits. Next offered 2012–2013.

B. Strauss.]

[HIST 6691 The Old English Laws and Their Politico-Cultural Context (also ENGL 4190, HIST 4691)]

Fall. 4 credits. Next offered 2011–2012.

P. Hyams and T. Hill.]

HIST 6720 Seminar in European Intellectual History (also COML 6720)

Fall. 4 credits. D. LaCapra. (EM)

[HIST 6730 Topics in Modern European Intellectual History (also COML 6730, JWST 6740)]

Spring. 4 credits. Next offered 2010–2011.

D. LaCapra.]

HIST 6750 Genocidal Regimes

Fall. 4 credits. J. Weiss.

History of genocidal regimes and the intellectual, political, and policy response to them. Intensive readings in early weeks are followed by research papers and presentations. Course includes travel to Washington (and, possibly, Ottawa) to brief government officials and activists. (EM)

[HIST 6760 History and Story in the Norse Sagas (also ENGL 4120, HIST 4760)]

Spring. 4 credits. Next offered 2010–2011.

O. Falk and T. Hill.]

[HIST 6800 Historical Approaches to Science (also STS 6801)]

Fall. 4 credits. Next offered 2010–2011.

P. Dear.]

[HIST 6810 Intellectual History of Empire (also ASIAN 6681)]

Spring. 4 credits. Next offered 2011–2012.

J. V. Koschmann and N. Sakoi.]

[HIST 6830 Seminar in American Labor History (also ILRCB 7081)]

Fall. 3 credits. Prerequisite: graduate standing. Next offered 2012–2013.

N. Salvatore.]

[HIST 6861 Readings in Japanese Historiography (also ASIAN 6686)]

Spring. 4 credits. Next offered 2010–2011.

K. Hirano.]

[HIST 6870 Seminar on Thailand (also ASIAN 6601, HIST 4870)]

Spring. 4 credits. Next offered 2010–2011.

T. Loos and T. Chaloehtiarana.]

[HIST 6880 History of Vietnam (also ASIAN 3385/6685, HIST 3880)]

Fall. 3 credits. Next offered 2010–2011.

K. Taylor.]

[HIST 6920 Approaches to Medieval Violence (also HIST 4910)]

Fall. 4 credits. Next offered 2010–2011.

O. Falk.]

[HIST 6930 Problems in Modern Chinese History (also ASIAN 4493/6693, HIST 4930)]

Fall. 4 credits. Next offered 2010–2011.

S. Cochran.]

[HIST 6940 Problems in Modern Chinese History (also ASIAN 4499/6694, HIST 4990)]

Fall. 4 credits. Prerequisite: HIST 2940 or permission of instructor. Next offered 2011–2012. S. Cochran.]

[HIST 6950 Premodern Southeast Asia (also ASIAN 3397, HIST 3950)]

Fall. 4 credits. Next offered 2010–2011.

E. Tagliacozzo.]

HIST 6960 Southeast Asian History from the 18th Century (also ASIAN 3960/6696, HIST 3960)

Spring. 4 credits. E. Tagliacozzo.
For description, see HIST 3960. (AS)

[HIST 6961 History of Medicine and Healing in China (also ASIAN 4469, BSOC/HIST/STS 4961)]

Spring. 4 credits. Next offered 2010–2011.
T. J. Hinrichs.]

[HIST 6970 Jim Crow and Exclusion-Era America (also AAS/HIST 4970, AMST 4970/6970)]

Fall. 4 credits. Limited to 15 students. Next offered 2011–2012. D. Chang.]

[HIST 6980 Seminar in Japanese Thought (also ASIAN 6698)]

Spring. 4 credits. Prerequisite: reading knowledge of Japanese. Next offered 2010–2011. J. V. Koschmann.]

HIST 7090 Introduction to the Graduate Study of History

Fall. 4 credits. Requirement for first-year graduate students. E. Tagliacozzo and D. Corpis.

This course is designed to introduce entering graduate students to crucial issues and problems in historical methodology that cut across various areas of specialization. (HR)

HIST 7110 Introduction to Science and Technology Studies (also STS 7111)

Fall. 4 credits. M. Lynch.
For description, see STS 7111. (HS)

HIST 8004–8007 Supervised Reading

4 credits each semester. Prerequisite: graduate standing. Permission of instructor required. Staff. (HR)

HISTORY OF ART

S. Samuels, chair; A. Alexandridis, J. E. Bernstock, M. I. Dadi, M. Fernández, C. Finley, S. Hassan, C. Lazzaro, K. McGowan, L. L. Meixner, A. Pan, J. Rickard, C. Robinson

The Department of the History of Art provides a broad range of introductory and advanced courses in art of Europe and the Americas, East and Southeast Asia, Africa, Native American art and Indigenous Studies from antiquity to the present.

The Major

Department majors acquire a broad understanding of the history of art in several chronological and geographical areas: ancient, medieval, Renaissance, modern (Europe and the Americas), Southeast Asia, China, Japan, Latin America, and Africa. Additionally, majors practice a range of art historical methods and interpretive strategies, including connoisseurship, dendrochronology, feminism, iconography, semiotics, critical theory, and social history. Majors are encouraged to locate the history of art within allied humanities fields and the applied arts by taking courses in history, literature, history of architecture, and fine arts. The study of foreign languages is strongly encouraged.

Requirements for the Major

Prospective majors should consult the director of undergraduate studies. Students wishing to declare a major in the history of art should have completed any two courses above the

1000 level at Cornell in the department by the end of their sophomore year and have received a grade of B or above in both.

Courses must be taken for a letter grade and must be at least a B– to count toward the major. These courses count toward the total 44 credits. The major in the history of art requires 44 credits, 30 at the 3000 level or above. The core requirements are: proseminar; another seminar at the 4000 level or above; two courses on art from the following time periods: Ancient Europe, Medieval/Islamic, or Renaissance/Baroque (one course per time period); two courses on art from the three following geographical areas: Africa, Asia, or Latin America (one course per region); and two courses on modern/contemporary art in Europe and North America, including art from outside the Anglo-American tradition. In addition to the 44 credits, majors are required to take two courses, approved by their advisors, in areas related to the history of art.

Honors

To become a candidate for the degree of bachelor of arts with honors in the history of art, a student must have a cumulative average of A– for all courses taken in the department and B+ in all arts and sciences courses.

Application to write an honors thesis should be made to the director of undergraduate studies during the second semester of the junior year. Students are advised to enroll in ARTH 4997 Honors Research at this time. The application must include a summary of the proposed project, an endorsement by a faculty sponsor, and a copy of the student's transcript. In the senior year the honors candidate will include ARTH 4998 and 4999 in his or her course load. These courses address the research and writing of the senior thesis under the direction of the student's project advisor.

Course Numbering System

1000-level courses are first-year writing seminars.

2000-level courses are introductions to the major subdivisions of Western art and art outside the West.

3000-level courses are intermediary courses addressing more specialized topics or epochs.

4000-level courses are seminars primarily for advanced undergraduates and graduate students.

6000-level courses are seminars primarily for graduate students.

First-Year Writing Seminars

For first-year writing seminar offerings in the history of art, consult the John S. Knight Institute brochure for times, instructors, and descriptions. These courses may not be used to satisfy the distribution requirement or the major.

Courses**ARTH 2000 Introduction to Visual Studies (also VISST/COML 2000, ENGL 2920) (LA-AS)**

Spring. 4 credits. I. Dadi.
For description, see VISST 2000.

ARTH 2019 Thinking Surrealisms (also COML 2200, VISST 2190) (LA-AS)

Fall. 4 credits. B. Maxwell.
For description, see COML 2200.

ARTH 2200 Introduction to Art History: The Classical World (also CLASS 2700) # (HA-AS)

Spring. 4 credits. K. Fisher.
The course is an overview of the art and archaeology of the Greek and Roman world, covering the sculpture, vase painting, and architecture of the ancient Greeks from the Geometric period through the Hellenistic, and the art of the Romans from the early Republic to the time of Constantine the Great.

[ARTH 2221 Archaeology of Roman Private Life (also ARKEO/CLASS 2743) # (CA-AS)]

Spring. 4 credits. Next offered 2011–2012.
A. Alexandridis.
For description, see CLASS 2743.]

[ARTH 2222 Archaeology of Greek Private Life (also CLASS/ARKEO/HIST 2744) # (CA-AS)]

Spring. 3 credits. Next offered 2010–2011.
K. Bowes.
For description, see CLASS 2744.]

[ARTH 2227 Art and Archaeology in the Ancient Mediterranean World (also ARKEO 2728, CLASS 2727) # (HA-AS)]

Fall. 3 credits. Next offered 2011–2012.
For description, see CLASS 2727.]

[ARTH 2350 Introduction to Art History: Islamic Art and Culture @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011.
C. Robinson.
Spanning the years between the advent of Islam as one of the world's great religions in the early 7th century AD and the end of the 14th century AD. Assignments will include two in-class and two take-home exams plus two shorter writing assignments.]

[ARTH 2400 Introduction to Art History: Renaissance and Baroque Art (also VISST 2645) # (HA-AS)]

Fall. 4 credits. Each student must enroll in a sec. Next offered 2010–2011. C. Lazzaro.
A survey of major works of European artists from 1400 to 1700, including all arts, with an emphasis on painting and on analysis of the artworks.]

ARTH 2402 Survey of European Art: Renaissance to Modern # (CA-AS)

Summer only. 3 credits. D. Royce-Roll.
The major traditions and movements in western European art from the Renaissance to the modern period. Painting, sculpture, and architecture with an emphasis on painting. Each Friday class meets at the Herbert F. Johnson Museum of Art with gallery talks and viewing of relevant works that supplement the previous four days of classroom lectures.

ARTH 2419 Rembrandt and His Circle: Technologies of Vision (also VISST 2419) # (CA-AS)

Fall. 4 credits. L. Pincus.
The variety of visual experience in 17th-century Dutch art is legion: still life, portraiture, self-portraiture, landscape, cityscape, genre, and architectural painting. New scientific technologies and trade routes, a robust economy and bustling commerce also place their marks on the cultural and artistic production in the Netherlands. In this course, we will dip into these multiple facets of the Dutch scene, but in critical rather than a general way, in order to assess Dutch "technologies of vision" in picturing and describing their world. Also important will be our inquiry into the context of Dutch art

production: the social, economic, and political factors that made the Dutch art market so unusually vital.

ARTH 2500 Introduction to the History of Photography (CA-AS)

Fall. 4 credits. I. Dadi.

Provides a survey of the history of photography over the course of two centuries. Starting with its invention in the 1830s, this course covers the subject topically and chronologically. During the 19th century, it focuses on technical developments and on the complex relations that situate photography in relation to painting, portraiture, urban life, war, anthropology, exploration, and science. During the 20th century, photography has been enriched by new developments that include its use as a modernist and experimental art form, in social documentary and photojournalism, in propaganda, in advertising and fashion, and its centrality in the practice of conceptual art, postmodernism, and in the digital era.

ARTH 2600 Introduction to Art History: The Modern Era (CA-AS)

Spring. 4 credits. Not open to students who have taken ARTH 2601. Each student must enroll in a sec. J. Bemstock.

Considers modern art in a historical and cultural context, from painting associated with the French Revolution through American pop art. The emphasis is on major movements and artists: Neo-Classicism (David), Romanticism (Delacroix), Realism (Courbet), Impressionism (Monet), Post-Impressionism (Van Gogh), Cubism (Picasso), Fauvism (Matisse), Surrealism (Miro), Abstract Expressionism (Pollock), and Pop Art (Warhol). Different critical approaches are examined.

ARTH 3100 History of Photography (LA-AS)

Summer. 4 credits. I. Dadi.

During the 19th century, it focuses on its technical development and on the complex relations that situate photography in relation to painting, portraiture, urban life, war, anthropology, exploration and travel, and science and industry. While these topics continue to be important during the 20th century, photography has been enriched by new developments that include its use as a modernist and experimental art form, in social documentary and photojournalism, in propaganda, in advertising and fashion, and its centrality in the practice of conceptual art, postmodernism, and in the digital age.

ARTH 3171 Architectural History of Washington, D.C. # (HA-AS)

Fall or spring. 4 credits. Prerequisite: students in Cornell in Washington program; nonarchitects. Staff.

Historical and critical survey of the architecture of Washington. Attention is given to the periods, styles, architects, and clients—public and private—of the notable buildings and to the urban landscape of the nation's capital. The vocabulary of architectural analysis and criticism is taught. Field trips required.

ARTH 3224 Hellenistic Culture: The Age of Alexander: Globalization in the Ancient World? (also CLASS 3744) @ # (CA-AS)

Spring. 4 credits. A. Alexandridis.

After Alexander the Great's conquest of the Near and Middle East, Greek language, education and material culture was disseminated in a vast area from the

Mediterranean to India and left a long lasting imprint even on areas, like Northern India, that had not previously been under direct Greek influence. On the Greek side, this encounter with so many different peoples and cultures deeply transformed Greek language, religion and material culture itself with simultaneously engendering a canonical idea of "Greekness." The resulting interaction created a manifold amount of mixed and specifically local cultures. The lecture course will analyze this process and try to understand whether it can be understood as a pre-modern example of "globalization." The class will cover the period from the advent of Alexander the Great (336–323 BC) until the end of the last Hellenistic kingdom, the Egypt of Cleopatra VII (51–30 BC). We will focus on phenomena such as urbanization and the formation of civic identities; assimilation and conflict, especially in a Jewish context; the advent of new Eastern religions; economy and trade routes as well as gender relations. The period as a whole has only recently become a focus of combined historical, philological and archaeological research. Therefore, current scholarly debates will form an integral part of the course.

[ARTH 3230 Iconography of Greek Myth (also CLASS 3727) # (HA-AS)

Spring. 4 credits. Next offered 2010–2011. A. Alexandridis.

This class will give an overview of the most important Greek myths and mythological figures as depicted in Greek and Roman times.]

ARTH 3250 Introduction to Dendrochronology (also ARKEO 3090, CLASS 3750) # (HA-AS)

Fall. 4 credits. S. Manning.

For description, see CLASS 3750.

ARTH 3300 Romanesque and Early Gothic Art and Architecture: Europe and the Mediterranean, 900 to 1150 AD (also NES 3759) # (LA-AS)

Spring. 4 credits. Prerequisite: ARTH 2350 or ARTH 2355; freshmen enrollment with permission of instructor only. C. Robinson.

Survey lectures and discussion of the visual cultures (architecture, luxury objects, book illumination and illustration) of the Medieval visual world, including northern and Mediterranean Europe (Ottonian, Romanesque, Early Gothic) and the Islamic World (Al-Andalus, Fatimid Egypt, Jerusalem), from 900–1150 AD. We will pay particular attention to the ways and places in which East and West meet and, following a brief introductory period at the beginning of each half of the semester, also will be engaging the material from a thematic and critical perspective.

ARTH 3303 History and Popular Culture in Africa (also ASRC/ENGL/HIST 3303)

Spring. 4 credits. J. Byfield.

For description, see ASRC 3303.

ARTH 3440 Leonardo, Michelangelo, and Raphael (also VISST 3443) # (HA-AS)

Spring. 4 credits. C. Lazzaro.

This course focuses on three great Renaissance artists, Leonardo, Michelangelo, and Raphael. It examines each as both thinker and artist, through his writings as well as his painting, sculpture, and architecture. It also analyzes the contemporary constructions of the artist as genius and as courtier in biographies and other writings about them.

Leonardo was an extraordinarily innovative painter partly because of the breadth of his thinking, and we will examine his treatises on artistic practice as well as anatomy, natural science, and engineering. Michelangelo invented grandiose artistic projects for his ambitious patrons, and his novel visual language has parallels with the verbal language in his poetry. Raphael was the consummate court artist, whose activities as antiquarian and archaeologist helped him to produce a new classicism.

ARTH 3500 African American Art (also ASRC 3500) (LA-AS)

Fall. 4 credits. C. Finley.

This course investigates the different forms of African-American visual artistic traditions in relation to their historical origins and sociocultural context from the early days of slavery to the present time. We start with an overview of African art and the experiences of the Middle Passage and slavery in relation to African-American traditions in the decorative arts including: pottery, architecture, ironwork, quilt making, and basketry. This is followed by a fine-art survey starting with the 18th and 19th centuries and continuing through the early-20th-century Harlem Renaissance up to the present. Certain issues related to African-American arts and creativity such as improvisation, Black Aesthetic, and Pan Africanism also are explored. Slides, films, and filmstrips are used extensively to illustrate topics discussed. Visits to museums and relevant current exhibitions may be arranged.

ARTH 3520 African American Cinema @ (LA-AS)

Fall. 4 credits. S. Hassan.

This course offers an overview of African cinema and filmmaking. It surveys historically the evolution of African cinema from its early days to the present. Through screening of selected African films, different trends within African cinema will be explored, such as "Return to the Sources" and the rediscovery of the pre-colonial past; the "Social Realist" narrative and critique of post-independence Africa; reconstructing the story of colonialism from the perspective of the colonized; and the entertainment genre. Techniques, style, and aesthetics of African cinema will also be discussed. The course offers a unique opportunity of looking at African culture and society, and at issues of social change, gender, class, tradition, and modernization through African eyes.

[ARTH 3550 Modern and Contemporary Latin American Art (also LATA 3680, LSP 3551) (HA-AS)

Fall. 4 credits. Next offered 2010–2011.

M. Fernandez.

This course is designed as a thematic survey of Latin American art from the early 20th century to the present.]

[ARTH 3600 Introduction to Art History: Contemporary Art: 1960 to Present (CA-AS)

Spring. 4 credits. Prerequisite: ARTH 2600 or equivalent. Next offered 2010–2011. I. Dadi.]

ARTH 3605 U.S. Art from FDR to Reagan (also AMST 3605) (LA-AS)

Fall. 4 credits. J. Bernstock.

Considers the contextual features of American art from the 1930s through the late 1980s. Examines art in relation to contemporary politics, society and literature. A few of the

developments on which the course focuses are: Abstract Expressionism, Pop Art, Earth Art, and Feminist Art. Examines various critical approaches.

[ARTH 3611 Art of South Asia, 1500-present (also ASIAN 3382) @ # (CA-AS)]

Spring. 4 credits. Next offered 2010–2011.
I. Dadi.

South Asian art since the early modern era, including Vijaynagar architecture, Mughal art, British colonial art, posters, and modern painting.]

ARTH 3740 Painting 19th-Century America (also AMST/VISST 3740) # (CA-AS)

Fall. 4 credits. Recommended: ARTH 2400.
L. L. Meixner.

Art and everyday life in 19th- and early 20th-century America with an emphasis on Anglo-European traditions. Considers democratic cultures and identities through topical units: the Peale family and America's first public museum; P. T. Barnum's dime museum, traveling circus, and working-class audiences; daguerreotypes and the rising middle class; genre painting and regional types such as the Yankee peddler, Missouri riverboatman, and the frontiersman; Hudson River School and the "tourist sublime"; artist-explorers, Darwin, and Latin America as a spectacle; class and gender construction in the Gilded Age; the Ashcan School, New York City, and urban spectators; immigrants and early documentary photography. Alongside paintings we consider political cartoons, fashion plates, advertisements, and popular illustrations.

ARTH 3760 Impressionism in Society (also FREN 3610, VISST 3662) # (CA-AS)

Spring. 4 credits. Not open to freshmen.
L. L. Meixner.

Discusses French Impressionist art as the product of 19th-century public life. By relating Impressionism to state culture, we trace subversive themes such as criminality, café-concert and brothel societies, clandestine prostitution, and class-regulated leisure. Students consider Parisian spectacle and commodity culture, the rise of the department store and gallery system, and the importance of print culture and photography to the movement. Images include paintings, playbills, posters, and advertisements. Organizing thematic units are theories of vision and power, urban surveillance, the flâneur and flâneuse, voyeurism, and early cinematic spectatorship. Artists include Manet, Monet, Atget, Cassatt, Degas, Tissot, Toulouse-Lautrec, and Van Gogh.

ARTH 3800 Introduction to the Arts of China (also ASIAN 3383/ARKEO 3800) @ # (LA-AS)

Fall. 4 credits. A. Pan.

This course offers a survey of the art and culture of China, from the Neolithic period to the 20th century. We begin with an inquiry into the meaning of national boundaries and the controversy of the Han Chinese people, which helps us identify the scope of Chinese culture. Pre-dynastic (or prehistoric) Chinese culture is presented through both legends about the origins of the Chinese, and scientifically excavated artifacts. Art of the dynastic and modern periods is presented in light of contemporaneous social, political, geographical, philosophical and religious contexts. Students work directly with objects in the Herbert F. Johnson Museum of Art.

[ARTH 3820 Introduction to the Arts of Japan (also ASIAN 3381) @ # (LA-AS)]

Fall. 4 credits. Next offered 2010–2011.
A. Pan.

As an island nation east of the Asian continent, Japan developed a unique culture that reflects both continental and indigenous characteristics. This course examines pre- and post-contact with continental culture and the process of artistic acculturation and assimilation in successive periods of Japanese art history.]

ARTH 3850 The Arts of Southeast Asia (also ASIAN 3350/VISST 3696) @ # (CA-AS)

Fall. 4 credits. K. McGowan.

The arts of Southeast Asia will be studied in their social context, since art plays a role in most of the salient occasions in life in traditional societies. Special emphasis will be devoted to developments in Indonesia, Thailand, and Cambodia. Among topics covered will be the shadow puppet theater of Java, textiles, architecture, sculpture, and Bali's performance tradition.

ARTH 3855 The House and the World: Architecture of Asia (also ASIAN 3394, VISST 3655) @ # (HA-AS)

Spring. 4 credits. K. McGowan.

In many Asian societies, houses are regarded as having a vitality of their own. This course will examine the role of the house as a living organism in Asia. Houses also function as storehouses for material and immaterial wealth; artifacts such as textiles, jewelry, sculptures, and masks function within the house as ancestral heirlooms, conveying their own currents of life force, the power from which serving to blend with the vitality of the house. The indigenous architectural traditions of India, Vietnam, Thailand, Indonesia, and the Philippines will be examined. By studying the inhabited spaces of others, divining their technologies of construction and their applied symbologies, students will be provided with powerful tools for examining the visual skills and sensibilities of other cultures.

ARTH 3915 Art in the Modern World (also ANTHR 3415) (CA-AS)

Summer only. 4 credits.

For description, see ANTHR 3415.

Seminars

Courses at the 4000 to 6000 level are open to juniors and seniors, majors, and graduate students unless otherwise stated. All seminars involve the writing and presentation of research papers. Enrollment is limited to 15 students. Students may repeat courses that cover a different topic each semester.

ARTH 4100 Proseminar (also VISST 4200, ARTH 6100) (HA-AS)

Spring. 4 credits. Limited enrollment.
Prerequisite: history of art majors. Grads should enroll in ARTH 6100. I. Dadi.

Works of art have always engendered political, social, and cultural meanings. This seminar introduces the methods that art historians have engaged in, studying the objects and ideas that constitute the historiography of their discipline. Challenged and enlarged by cultural debates over issues of class, ethnicity, nationality, sexual orientation, and gender, the field of art history is expanding to incorporate problems of assessing quality of intention and reception along with authorship, of artistic production in place of artistic creation, and of Western-oriented attitudes to race in reference to orientalism and colonialism. Readings focus

on historically situating methods and the implications of their cross-cultural application. Papers encourage students to put methods into practice, realizing in the process that subject matter is not an isolated choice to which methods are applied, but something that profoundly affects the approach the researcher brings to the writing of art history. In addition to the seminar meeting from 2:30 to 4:30, students are required to attend the Visual Culture Colloquium held on most Mondays from 5 to 6:30 p.m.

ARTH 4107 The Museum and the Object (also VISST 4607) (CA-AS)

Fall. 4 credits. Prerequisite: history of art majors; freshmen and sophomores by permission of instructor. All classes meet in Johnson Art Museum study gallery.
K. McGowan.

Gives advanced students the opportunity to work directly with original objects from the collection in the Herbert F. Johnson Museum. Focuses on art and connoisseurship by questioning the ways quality is determined in works of art. Topics include methods of attribution, fakes and forgeries, technique and media, restoration and conservation, art education and theories of perception. Session leaders include the curatorial staff of the art museum.

[ARTH 4150 Intro to Critical Theory (also ARTH 6170) (CA-AS)]

Fall. 4 credits. Next offered 2010–2011.
M. Fernandez.

This seminar will introduce students to theoretical texts relevant to multiple areas in the history of art and visual culture.]

[ARTH 4236 Sexuality in Greek and Roman Art (also ARTH 6236, CLASS 4733) # (CA-AS)]

Fall. 4 credits. Next offered 2010–2011.
A. Alexandridis.]

ARTH 4305 Looking for Love: Visual and Literary Cultures of Love in the Medieval Mediterranean 1100–1400 AD (also NES 4795)

Spring. 4 credits. C. Robinson. Prerequisite: Permission of instructor required.

A comparative and interdisciplinary seminar whose focus is the visual world created by the pan-Mediterranean (Iberian Peninsula, Maghreb, France, Italy, Turkey, Egypt, and Persia) culture of "Courtly Love" beginning during the 11th century AD, and continuing as a principle factor in medieval cultural production for the remainder of the period. Particular attention will be paid to the ways in which the visual dimensions of this culture nuance, compliment, contradict, or at times even exist independently of, its oral and written spheres. Reading knowledge of any Romance or Semitic language and/or Persian, in addition to English, is highly advantageous.

[ARTH 4311 The Multicultural Alhambra (also NES 4511)]

Spring. 4 credits. Next offered 2010–2011.
C. Robinson.

An interdisciplinary seminar structured around the mythic palace built by the Nasrid dynasty in Granada, Spain.]

[ARTH 4331 Topics in Islamic Art (also ARTH 6331, NES 4731/6731) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011.
C. Robinson.]

ARTH 4440 Constructing the Self in the 16th Century (also ARTH 6440) # (HA-AS)

Spring. 4 credits. C. Lazzaro.

This seminar examines the construction of the self through gender, class, and group identity in early modern Europe, especially Italy. Portraits, self-portraits, and autobiographies recorded self-fashioning in clothing, bearing, gesture, manners, and speech, while etiquette manuals instructed in civility, the mark of class and education. The course considers some of the public and private settings in which the social self was performed, among them studies and banquets, as well as such socially constructed identities as the male adolescent and the female poet.

[ARTH 4445 Nature, Cultural Landscape, and Gardens in Early Modern Europe (also ARTH 6445)]

Fall. 4 credits. Next offered 2010-2011. C. Lazzaro.

Examines cultural understandings of nature in early modern Europe, especially Italy.]

[ARTH 4451 Prints and Visual Culture in Early Modern Europe (also VISST 4451, ARTH 6451) # (HA-AS)]

Fall. 4 credits. Meets at the Johnson Museum. Next offered 2011-2012. C. Lazzaro.]

ARTH 4506 Caribbean Dialogs: Online! @ (CA-AS)

Summer only. 4 credits. P. Archer-Straw. Using Caribbean art as a case study, the course explores themes such as new world history, colonialism, Diaspora, trauma, violence and tourism. Through an understanding of basic cultural theory, class members come to see how perceptions of Caribbean culture are historically fluid and subject to variation as they are categorized and textualized. Similarly through active participation students are invited to question their own considerations of identity, culture, race and ethnicity. Caribbean Dialogs: Online! examines the imaginary, creative spirit of the region's artists to show ways that they are reconfiguring themselves to meet the needs of a changing world at once apprehensive but also charmed by black culture.

[ARTH 4508 Exhibiting Cultures: Museums, Monuments, Representation and Display (also AMST 4508/6508, ARTH 6508, ASRC 4504/6508) (CA-AS)]

Fall. 4 credits. Grad students should enroll in 6508. Next offered 2010-2011. C. Finley.]

ARTH 4509 Black Arts Movement (also ASRC 4505, AMST 4509) (CA-AS)

Summer. 4 credits. C. Finley.

This distance learning course examines the art, music, literature and film of African Americans during the 1960s. The Black Arts Movement was an explosive cultural flourishing that emerged in the United States in the wake of African liberation and decolonization movements abroad in Civil Rights and Black Power movements locally and internationally.

ARTH 4600 Studies in Modern Art (LA-AS)

Fall. 4 credits. Permission of instructor required.

This seminar examines both feminist art criticism and the work of women artists from antiquity to the present. We consider the works of the most prominent women artists

from each period in relation to the changing roles of women in society. The artists covered include Jennifer Barlett, Artemisa Gentileschi, Elizabeth Vigee-Lebrun, Mary Cassatt, Kathe Kollwitz, Georgia O'Keefe, Louise Nevelson, Joan Mitchell, Judy Chicago, and Barbara Kruger.

[ARTH 4690 Comparative Modernities (also ARTH 6690, VISST 4641) @ (CA-AS)]

Fall. 4 credits. Next offered 2010-2011. I. Dadi.]

ARTH 4695 Studies in Global Modern Art (also ARTH 6695) @ # (CA-AS)

Fall. 4 credits. I. Dadi.

Topic for fall 2009: Orientalism and Modern Art of the Middle East: This seminar explores how the "Orient" has been visually represented in Western art, architecture, literature, and media since the 19th century. Popular and scholarly ideas about the Orient and Orientalism have come under increasing scrutiny since the publication of Edward Said's influential critique. Explores debates surrounding Said's critique, and also discuss its salience in the analysis of modern and contemporary art and visual culture. Includes discussions of French Orientalist paintings; Hollywood depictions of the Orient; national independence movements that redeployed colonial textual and visual archives to formulate the national past. Examines the strategies of modern and contemporary artists from the Middle East who have appropriated, resisted and bypassed the troupe of Orientalism altogether.

ARTH 4696/6696 The Art Market (also ARTH 6696) (LA-AS)

Fall. 4 credits. C. Finley.

This course will examine the history of the art market, from the 16th century to the present. We will study the production, sale and exchange of works of art as well as the patrons, artists and collectors who participate in this economic, social and political form of taste-making and aesthetic valuation. Students will learn about noted patrons of the arts, such as the Medici family in Renaissance Italy, our main focus will be on the creation of a global art market in the 20th century. Using case studies, sample topics include: the patterns of transportation, exchange and trade; the interaction of collectors, critics and curators; the spaces and contexts of display of contemporary collections; auction houses and commercial galleries; and fakes, forgeries, thefts and scandals. Special attention will be paid to considering the contemporary art market (post-1980) and the collecting, exchange and valuation of film, photography, painting, performance and installation art. Global markets for the exchange of art in Asia, Europe Africa, North America and South America will be highlighted as well as the exhibitions of contemporary art such as Art Basel, the Cairo Biennale and the Venice Biennale that fuel these markets.

ARTH 4761 Art and Social Histories (also AMST, VISST 4761) (CA-AS)

Fall and spring. 4 credits. Permission of instructor required. Auditing not permitted. Not open to freshmen.

Topic for fall 2009: Public Culture and the Great Depression. Seminar explores public art and poplar entertainments as the means for everyday people to politically engage or escape the Great Depression (1929-41). Discussions include Living Newspapers, the

Federal Theater Project, Union-sponsored theater including Pins and Needles, WPA muralists and printmakers, FSA photographers, Social Realists including Ben Shahn, Reginald Marsh, and Philip Evergood, alongside Grant Wood and the Regionalists. Connecting these is FDR's New Deal and its controversial government support for the arts. We consider big bands and swing, pulp and comic strips, star tabloids, Depression-era Hollywood gangster films, screwball comedies, and Fred Astaire and Ginger Rogers spectacles. Will examine the importance of early radio in the home through FDR's fireside chats, soap operas, and serial thrillers such as the Shadow. Students will draw on the American Memory Project, documentaries, and the Johnson Art Museum collections. Films include *It Happened One Night*, *Gay Divorcee*, *Double Indemnity*, and Woody Allen's *Radio Days*.

ARTH 4771 Indigenous Art, Film, and New Media: Anti-Colonial Strategies (also ARTH 6771, COML 4771/6771) (CA-AS)

Fall. 4 credits. J. Rickard.

This course examines Indigenous art, new media, and film from three distinct interrelated perspectives of aesthetics/theory, technology, and history/culture. The relationship between technology and tradition reevaluates established assumptions between representation, power, and the gaze. Decolonizing methodologies will establish the translatability of Indigenous oral tradition to visual expression as a form of cultural agency. The use of media as a cultural and political intervention will be discussed through the work of Hopi filmmaker Victor Masayesva, Inuit filmmaker Zacharias Kunuk, the Kayapo Media Collective, Aboriginal artist Tracy Moffat, new media artist; Mohawk, Skawanati, Maori photographer John Miller, and more. The construction, circulation, and reception of Indigenous visual culture will be discussed within a transnational, diasporic, and global frame.

[ARTH 4815 Buddhist Arts of China (also ARTH 6815) @ # (CA-AS)]

Fall. 4 credits. Next offered 2010-2011. A. Pan.]

ARTH 4818 Exhibition Seminar (also ARTH 6818) @ (CA-AS)

Fall. 4 credits. A. Pan.

Public display of art objects and artifacts involves more than just artistic presentations. How is the title selected? What (whose) work is included? How are they displayed? How are they framed in the exhibition space as well as in an exhibition catalogue? These complex issues are integral to exhibition discourse. Students review past exhibitions and design a new exhibition based on the collection at the Herbert F. Johnson Museum of Art. The final product will be on view to the public and will be accompanied by an exhibition catalogue co-authored by all participants in the seminar. Students will learn how to engage in academic and scholarly inquiry of issues related to exhibition design, and will experience hands-on aspects of museum work related to organizing an exhibition.

ARTH 4821 Mobility and Invention (also SHUM/VISST 4821)

Fall. 4 credits. Limited to 15 students. M. Fernandez.

For description, see SHUM 4821.

ARTH 4825 African Port Cities: Empire Building at the Crossroads (also ASRC 4607, SHUM/VISST 4825)

Fall. 4 credits. Limited to 15 students.
P. Meier.

For description, see SHUM 4825.

ARTH 4855 Threads of Consequence: Textiles in South and Southeast Asia (also ASIAN 4487)

Spring. 4 credits. K. McGowan.

From boldly patterned cotton mantles to simple working garments, sumptuous silks to embroidered story cloths encircling shrines—textiles play a salient role in the ceremonial and ritual life of many Asian societies. This seminar explores how patterned cloths serve as a symbolic medium, functioning on multiple levels of understanding and communication. As spun, dyed, and woven threads of consequence, textiles can be seen to enter into all phases of social, economic, political, religious, and performance processes, often assuming unusual properties and attributes. As bearers of talismanic messages, signifiers of rank, and as the recipients of influences from maritime trade and touristic demand, textiles are read between the folds of complex exchange mechanisms in South and Southeast Asia.

ARTH 4858 Dancing the Stone: Body, Memory, and Architecture (also ASIAN 4456)

Spring. 4 credits. Prerequisite: permission of instructor. K. McGowan.

This course examines the role of temples and their sculptural programs in South and Southeast Asia as a creative stimuli for performative reenactments. Choreographic encounters between imagination and memory are mapped as they occur at various points historically and politically in Java, Bali, Cambodia, and India. Because architectural choreography implies the human body's inhabitation and experience of place, the nature of ritualized behavior and its relationship to performance and politics is explored spatially, both in organizing experience and defining or redefining identity on colonial, national, and diasporic margins. Students have the unique opportunity to balance the demands of learning a Javanese traditional dance and/or its musical accompaniment, taught by visiting artists while exploring performance traditions in historical perspective.

ARTH 4934 Art Writing: Tracing the Visible (also SHUM/VISST 4934)

Spring. 4 credits. Limited to 15 students.
M. Jacobus.

For description, see SHUM 4934.

ARTH 4991 Independent Study

Fall. 1–4 credits; may be repeated for credit. Prerequisite: permission of department faculty member.

Individual investigation and discussion of special topics not covered in the regular course offerings, by arrangement with a member of the department.

ARTH 4992 Independent Study

Spring. 1–4 credits; may be repeated for credit. Prerequisite: permission of department faculty member.

Individual investigation and discussion of special topics not covered in the regular course offerings, by arrangement with a member of the department.

ARTH 4997 Honors Research

Fall or spring. 2 credits. Staff.

The prospective honors student does rigorous independent readings supervised by a selected thesis advisor. By the end of the semester, an annotated bibliography and detailed outline of the thesis should be completed.

ARTH 4998 Honors Work I

Fall. 4 credits. Intended for senior art history majors who have been admitted to the honors program.

Basic methods of art historical research are discussed and individual readings assigned, leading to selection of an appropriate thesis topic.

ARTH 4999 Honors Work II

Spring. 4 credits. Prerequisite: ARTH 4998.

The student under faculty direction prepares a senior thesis.

ARTH 5991–5992 Supervised Reading

5991, fall; 5992, spring. 1–4 credits; may be repeated for credit. Prerequisite: graduate standing.

ARTH 5993–5994 Supervised Study

5993, fall; 5994, spring. 1–4 credits; may be repeated for credit. Prerequisite: graduate standing.

ARTH 6060 Visual Ideology (also GERST 6600)

For description, see GERST 6600.

ARTH 6100 Proseminar (also ARTH 4100, VISST 4200)

Spring. 4 credits. Limited enrollment. Undergraduates should enroll in ARTH 4100. I. Dadi.

For description, see ARTH 4100.

[ARTH 6170 Intro to Critical Theory (also ARTH 4150)

Fall. 4 credits. Next offered 2010–2011.
M. Fernandez.

For description, see ARTH 4150.]

[ARTH 6252 Research Methods in Archaeology (also CLASS 7742)

Spring. 4 credits. Next offered 2010–2011.
S. Manning.

For description, see CLASS 7742.]

ARTH 6305 Dress, Cloth, and Identity in Africa and the Diaspora (also ASRC/HIST/ANTHR/FSAD 6305)

Spring. 4 credits. J. Byfield.

For description, see ASRC 6305.

[ARTH 6311 The Multicultural Alhambra (also ARTH 4311, NES 4511)

Spring. 4 credits. Next offered 2010–2011.
C. Robinson.

For description, see ARTH 4311.]

[ARTH 6331 Topics in Islamic Art (also ARTH 4331, NES 4731/6731)

Fall. 4 credits. Next offered 2010–2011.
C. Robinson.]

ARTH 6440 Constructing the Self in the 16th Century (also ARTH 4440)

Spring. 4 credits. C. Lazzaro.

For description, see ARTH 4440.

[ARTH 6445 Nature, Cultural Landscape, and Gardens in Early Modern Europe (also ARTH 4445)

Fall. 4 credits. Next offered 2010–2011.
C. Lazzaro.

For description, see ARTH 4445.]

[ARTH 6508 Exhibiting Cultures: Museums, Monuments, Representation and Display (also AMST 4508/6508, ARTH 4508, ASRC 4504/6508)

Spring. 4 credits. Undergraduates should enroll in ARTH 4508. Next offered 2010–2011. C. Finley.

For description, see ARTH 4508.]

[ARTH 6690 Comparative Modernities (also ARTH 4690, VISST 4641)

Fall. 4 credits. Next offered 2010–2011.
I. Dadi.

For description, see ARTH 4690.]

ARTH 6695 Studies in Global Modern Art (also ARTH 4495)

Fall. 4 credits. I. Dadi.

For description, see ARTH 4495.

ARTH 6696 The Art Market (also ARTH 4696)

Fall. 4 credits. C. Finley.

For description, see ARTH 4696.

ARTH 6771 Indigenous Art, Film, and New Media: Anti-Colonial Strategies (also ANTHR 4771/6471, ARTH 4771, COML 4771/6771)

Fall. 4 credits. J. Rickard.

For description, see ARTH 4771.

ARTH 6818 Exhibition Seminar (also ARTH 4818)

Fall. 4 credits. A. Pan.

For description, see ARTH 4818.

HUMAN BIOLOGY PROGRAM

J. Haas, nutritional sciences, director (220 Savage Hall, 255–2665); A. Clark (molecular biology and genetics); P. Cassano (nutritional sciences); B. Finlay (psychology); J. Fortune (physiology/women's studies), E. Frongillo (nutritional sciences), R. Johnston (psychology), K. A. R. Kennedy (ecology and systematics/anthropology), D. Levitsky (nutritional sciences), D. L. Pelletier (nutritional sciences), W. Provine (ecology and systematics/history), S. Robertson (human development), R. Savin-Williams (human development), M. Small (anthropology)

Human biology integrates the methods and theories of many disciplines, such as biological anthropology, nutrition, neurobiology, physiology, psychology, demography, ecology, genetics, and paleontology into a comprehensive study of biological diversity in *Homo sapiens*. A central focus of this interdisciplinary approach to the study of the human organism is an understanding of evolutionary processes that explain our biological variation through space and time. The curriculum of study seeks to educate future biological scientists to address the concerns of a society that is becoming more demanding of the scientific community to place its specialized biological knowledge in a broad context. The human biology curriculum is of particular relevance to undergraduate students in premedical and predentistry programs, biological anthropology, nutrition, human development, ecology and evolutionary biology, psychology, physiology, genetics, and the health-related sciences. It serves to bring together students who have a common interest in humankind as defined from these diverse fields and to provide a forum for student–faculty interaction on various topics relating to human evolution

and biological diversity. Human biology is not a major but a curriculum of study that provides majors in various departments and colleges with a program for selecting elective courses that deal with the biology of the human species. Students after their freshman year may develop a program of study in human biology while majoring in any one of a number of different departmental fields.

Basic Requirements

The requirements for a program of study in human biology are designed to ensure sufficient background in physical sciences and mathematics to enable the student to pursue a wide range of interests in the fields of modern biological sciences, anthropology, and fields related to the evolution and biological diversity of the human species. Adjustments may be made in these requirements, depending on the student's academic background and affiliation with colleges and schools within the university.

The basic requirements are one year of introductory biology (BIOG 1101-1103 plus 1102-1104 or 1105-1106 or BIOG 1107-1108 offered during the eight-week Cornell Summer Session); one year of general chemistry (CHEM 2070-2080 or 2150-2160); one course of college mathematics (MATH 1110, 1106, or 1105 or equivalent); one course in genetics (BIOGD 2800, 2810, or 2820); one course in biochemistry (BIOBM 3300, 3310, 3320, or 3330 or NS 3200). It is recommended that students planning graduate study in biological anthropology, psychology, and related fields in the medical and nutritional sciences take a course in statistics. Students should consult their faculty advisor in human biology for help in selecting appropriate courses.

Elective courses should be taken that enable the student to acquire breadth in the subject matter of human biology outside of their departmental major. Therefore only 6 of the 15 human biology elective credits may also fulfill requirements for the major. Courses should be selected that also provide sufficient exposure to the integration of basic anatomical and physiological sciences with the behavior of individuals and groups within the context of evolutionary theory and ecology. The courses listed below are representative of the offerings in human biology and are included to assist the student in organizing a curriculum of study. They are organized into three groups that reflect the three levels of integration noted above: (1) human anatomy and physiology, (2) human behavior, and (3) human evolution and ecology. Students should choose at least one course from each of these areas of integration. It is anticipated that the student will include in a program of study at least one of the laboratory courses offered. It is expected that a student will take a minimum of 15 credits from among these courses.

There is no foreign language requirement for human biology beyond what is dictated by specific departments and colleges. The requirements for the human biology curriculum are set alongside requirements of the undergraduate majors as these are defined by different departments. Students with independent majors may design their own programs of study under the guidelines provided by their college. Although a student may indicate an interest in human biology in the freshman year and be able to obtain early guidance from a faculty advisor representing

the curriculum of study, it is more usual for students to establish their course programs in the first semester of the junior year. The student may request one of the faculty advisors in his or her department who is listed as faculty in human biology to be their principal advisor, or he or she may have an advisor in the department of the major and seek the advice of a human biology faculty advisor in matters pertaining to satisfaction of the requirements. In certain cases a faculty advisor may represent both the major and the curriculum of study in human biology.

Courses

Human Anatomy and Physiology

ANSC 4100 Nutritional Physiology and Metabolism

Fall. 3 credits.

BIOAP 2140 Biological Basis of Sex Differences (also BSOC 2141, FGSS 2140)

Spring. 3 credits.

BIOAP 3110 Introductory Animal Physiology, Lectures (also VETPH 3460)

Fall. 3 credits.

BIOAP 3190 Animal Physiology Experimentation

Fall. 4 credits.

BIOAP 4270 Fundamentals of Endocrinology

Fall. 3 credits.

BIOAP 4580 Mammalian Physiology

Spring. 3 credits.

BIOBM 4340 Applications of Molecular Biology to Medicine, Agriculture, and Industry

Fall. 3 credits.

BIOBM 4390 Molecular Basis of Human Disease (also BIOGD 4390)

Fall. 3 credits.

BIOGD 4870 Human Genomics

Fall. 3 credits.

BIOMI 4170 Medical Parasitology (also VETMI 4310)

Fall. 2 credits.

FDSC 1500 Food Choices and Issues

Spring. 2 credits.

FSAD 4390 Biomedical Materials and Devices for Human Body Repair

Spring. 2-3 credits.

NS 1150 Nutrition, Health, and Society

Fall. 3 credits.

NS 1220 Nutrition and the Life Cycle

Spring. 3 credits.

NS 3150 Obesity and the Regulation of Body Weight (also PSYCH 3150)

Spring. 3 credits.

NS 3220 Maternal and Child Nutrition

Spring. 3 credits.

NS 3310 Physiological and Biochemical Bases of Human Nutrition

Spring. 4 credits.

NS 3410 Human Anatomy and Physiology

Spring. 3 credits.

NS 3420 Human Anatomy and Physiology Laboratory

Spring. 2 credits.

NS 3610 Biopsychology of Normal and Abnormal Behavior (also PSYCH 3610)

Fall. 3 credits.

NS 4210 Nutrition and Exercise

Spring. 3 credits.

NS 4310 Mineral Nutrition and Chronic Disease

Fall. 3 credits.

NS 4410 Nutrition and Disease

Fall. 4 credits.

NS 4750 Mechanisms Underlying Mammalian Developmental Defects (also BIOAP 4750)

Spring. 3 credits.

NS 6140 Topics in Maternal and Child Nutrition

Fall. 3 credits.

PSYCH 3220 Hormones and Behavior (also BIONB 3220)

Fall. 3 or 4 credits.

PSYCH 4250 Cognitive Neuroscience

Fall. 4 credits.

Human Behavior

ANTHR 3305 Anthropology of Parenting

Spring. 3 credits.

ANTHR 3390 Primate Behavior and Ecology

Spring. 4 credits.

ANTHR 4930 Topics in Biological Anthropology

Spring. 4 credits.

BIONB 3310 Human Sociobiology

Spring. 3 credits.

BIONB 3920 Drugs and the Brain

Fall. 4 credits.

BIONB 4210 Effects of Aging on Sensory and Perceptual Systems (also PSYCH 4310/6310)

Fall. 3 or 4 credits.

BIONB 4270 Darwinian Medicine

Fall. 4 credits.

BIONB 4280 Clinical Neurobiology

Fall. 3 credits.

BIONB 4310 Genes and Behavior

Spring. 3 credits.

BIONB 4960 Bioacoustic Signals in Animals and Man

Fall. 3 credits.

BIOPL 2470 Ethnobiology

Fall. 3 credits.

BIOPL 3480 The Healing Forest

Spring. 2 credits.

BIOPL 3800 Strategies and Methods in Drug Discovery

Spring. 2 credits.

BIOPL 4420 Current Topics in Ethnobiology

Fall. 3 credits.

BSOC 2051 Ethical Issues in Health and Medicine (also STS 2051)

Fall. 4 credits.

DEA 3250 Human Factors: Ergonomics—Anthropometrics

Fall. 3 credits.

DEA 3500 Human Factors: The Ambient Environment

Spring. 3 credits.

DEA 4700 Applied Ergonomic Methods

Spring. 3 credits.

HD 2200 The Human Brain and Mind: Biological Issues in Human Development (also COGST 2200)

Fall. 3 credits.

HD 3200 Human Developmental Neuropsychology

Spring. 3 credits.

HD 3440 Infant Behavior and Development

Fall. 3 credits.

HD 4330 Developmental Cognitive Neurosciences (also COGST 4330)

Spring. 3 credits.

NS 2450 Social Science Perspectives on Food and Nutrition

Fall. 3 credits.

NS 3470 Human Growth and Development: Biological and Behavioral Interactions (also BSOC 3471, HD 3470)

Spring. 3 credits.

NS 3610 Biopsychology of Normal and Abnormal Behavior (also PSYCH 3610)

Fall. 3 credits.

PAM 3800 Human Sexuality

Spring. 4 credits.

PSYCH 2230 Introduction to Biopsychology

Fall. 3 credits.

PSYCH 3260 Evolution of Human Behavior

Spring. 4 credits.

PSYCH 3320 Biopsychology of Learning and Memory (also BIONB 3280)

Spring. 3 credits.

PSYCH 4250 Cognitive Neuroscience (also BIONB 4230)

Fall. 4 credits.

PSYCH 4270 Evolution of Language (also COGST 4270)

Fall. 3 credits.

PSYCH 4400 The Brain and Sleep

Fall. 4 credits.

Human Evolution and Ecology**ANTHR 1300 Human Evolution: Genes, Behavior, and the Fossil Record**

Fall. 3 credits.

ANTHR 2200 Early People: The Archaeological and Fossil Record (also ARKEO 2200)

Spring. 3 credits.

ANTHR 3305 Anthropology of Parenting

Spring. 4 credits.

ANTHR 3375 Evolutionary Theory and Human Behavior

Spring. 4 credits.

ANTHR 3390 Primate Behavior and Ecology

Spring. 4 credits.

ANTHR 4390 Topics in Biological Anthropology

Spring. 4 credits.

BIOEE 2070 Evolution

Fall or summer. 3 credits.

BIOEE 2780 Evolutionary Biology

Fall or spring. 3 or 4 credits.

BIOEE 3710 Human Paleontology (also ANTHR 3710)

Fall. 4 credits.

BIOEE 4640 Macroevolution

Spring. 4 credits.

BIOEE 4690 Food, Agriculture, and Society (also BSOC/STS 4691)

Spring. 3 credits.

BIOGD 4810 Population Genetics

Fall. 4 credits.

BIOGD 4820 Human Genetics and Society

Fall. 4 credits.

BIOGD 4840 Molecular Evolution

Spring. 3 credits.

BIOGD 4870 Human Genomics

Fall. 3 credits.

BTRY 4830 Quantitative Genomics and Genetics

Spring. 4 credits.

DSOC 2010 Population Dynamics (also SOC 2202)

Spring. 3 credits.

DSOC 2200 Sociology of Health of Ethnic Minorities (also LSP 2200)

Fall. 3 credits.

DSOC 4100 Health and Survival Inequalities (also SOC 4100)

Fall. 4 credits.

ENTOM 3070 Pesticides, the Environment, and Human Health

Fall. 2 credits.

ENTOM 3520 Medical and Veterinary Entomology

Fall. 3 credits.

NS 2060 Introduction to Global Health

Spring. 3 credits.

NS 2750 Human Biology and Evolution (also ANTHR 2750)

Fall. 3 credits.

NS 3060 Nutritional Problems of Developing Nations

Spring. 3 credits.

NS 3350 Epidemiology in Context

Spring. 3 credits.

NS 4500 Public Health Nutrition

Spring. 2 credits.

NS 4570 Economics of Hunger and Malnutrition (also ECON 4740)

Spring. 3 credits.

NS 4600 Explorations in Global Health

Spring. 3 credits.

NS 6520 Foundations of Epidemiology

Spring. 3 credits.

PAM 4380 Economics of Public Health

Fall. 3 credits.

PSYCH 3260 Evolution of Human Behavior

Spring. 4 credits.

PSYCH 4720 Evolution of Language (also COGST 4270)

Fall. 3 credits.

VETMI 4310 Medical Parasitology (also BIOMI 4170)

Fall. 2 credits.

VTPMD 6640 Introduction to Epidemiology

Fall. 3 credits.

HUNGARIAN

See "Department of Linguistics" and "Russian."

INDEPENDENT MAJOR PROGRAM

J. Finlay, director, 55 Goldwin Smith Hall, 255-5004.

The Independent Major Program is described in the introductory section of "College of Arts and Sciences."

IM 3510 Independent Study

Fall or spring. 1–4 credits. Prerequisite: permission of program director.

IM 4990 Honors Research

Fall or spring. 1–8 credits; max. of 8 credits may be earned for honors research. Prerequisite: permission of program director. Each participant must submit brief proposal approved by Honors Committee.

INDONESIAN

See "Department of Asian Studies."

INEQUALITY MINOR363 Uris Hall
www.inequality.cornell.edu
254-8674

The study of inequality lies at the heart of current debates about segregation, affirmative action, the "glass ceiling," globalization, and any number of other contemporary policy issues. In recent years, public and scholarly interest in issues of inequality has intensified, not merely because of historic increases in income inequality in the United States and other advanced industrial countries, but also because inequalities of race, ethnicity, and gender are evolving in equally dramatic and complicated ways.

The inequality minor allows undergraduate students to supplement their studies for their major with a coherent program of courses oriented toward the study of inequality. Although Cornell University is a leading center of scholarship on poverty and inequality, this strength is necessarily distributed across many departments and colleges; an interdisciplinary minor thus allows students to combine these resources into an integrated program of study. The institutional home for the inequality minor is the Center for the Study of Inequality

(located at 363 Uris Hall and at www.inequality.cornell.edu).

The inequality minor is appropriate for students interested in government service, policy work, and related jobs in non-governmental organizations (NGOs) as well as students who wish to pursue post-graduate education in such fields as public policy, economics, government, law, history, psychology, sociology, anthropology, literature, and philosophy. In many of these fields, the study of inequality is becoming increasingly central and fundamental, and the inequality minor can therefore provide students with a valuable and unique foundation for further study.

The inequality minor is an interdisciplinary program that should be completed in conjunction with a major. The minor is open to students enrolled in any of the seven Cornell undergraduate colleges. When the requirements of the minor are met, a certification is recorded on a student's academic record.

Minor Requirements

The inequality minor exposes students to a breadth of approaches, methods, and topic areas while also allowing them to tailor a program to their particular interests. The requirements are as follows:

1. Overview Course

The required overview course may be selected from any of the eight courses listed below. When possible, the overview course should be completed early in the program, as it serves to define the field and to expose students to areas and topics that might be explored in future course work.

- Income Distribution (ILRLE 4410)
- Inequality, Diversity, and Justice (CRP/SOC 2930, GOVT 2935, PHIL 1930)
- Social Inequality (SOC 2208 and DSOC 2090)
- Comparative Social Inequalities (DSOC 3700 and SOC 3710)
- Organizations and Social Inequality (ILROB 6260)
- Racial and Ethnic Differentiation (PAM/SOC 3370)

2. Controversies About Inequality

(DSOC/ILROB/PAM/SOC 2220, GOVT 2225, PHIL 1950)

This 3-credit course introduces students to current controversies in the study of inequality while facilitating interdisciplinary dialogue between concentrators and faculty members at Cornell University. Students are exposed to research on inequality under way at Cornell presented by guest lecturers and also participate in debates on pressing inequality-relevant issues (e.g., welfare reform, school vouchers, immigration policy, affirmative action).

3. Electives

In addition to the overview course and core course, students must select four electives from the list of qualified courses. This list can be viewed on the web site for the Center for the Study of Inequality, www.inequality.cornell.edu. Although students may tailor their programs to match their interests, the electives and overview course must be distributed

across at least three departments (thereby ensuring breadth in the analytic approaches that are represented).

4. Lectures and Seminars

The Center for the Study of Inequality (CSI) hosts occasional lectures and symposia, and minors are expected to attend them when possible. These events will be announced via e-mail and are also listed on the center web site, www.inequality.cornell.edu.

Enrolling in the Minor

The web site for the Center for the Study of Inequality, www.inequality.cornell.edu, provides current information on the Inequality Minor. For students considering the minor, it may be useful to schedule a meeting with the assistant to the director (inequality@cornell.edu).

Sample Programs

The inequality minor allows students considerable flexibility in devising programs that reflect their interests. As examples of possible programs, we have listed below sample tracks, each comprising a different set of possible electives. The first program listed below is a general track that provides an overview of the field, while the remaining nine programs are more specialized and focus on particular issues within the field. This sampling of programs is obviously illustrative and does not cover the entire wide range of interests that may be addressed within the minor.

Globalization and Inequality

As a global economy takes hold, there has been increasing concern that economic inequalities will grow apace, especially North-South inequalities between rich and poor countries. The countervailing "optimistic view" is that between-country disparities will in the long run wither away and render inequality an entirely internal, within-country affair. These and related lines of argumentation can be explored in courses that address such topics as trends in income inequality, theories of economic development, emerging patterns of international migration, and globalization and gender.

1. *Overview Course (choose any one)*
2. *Controversies About Inequality* (DSOC/ILROB/PAM/SOC 2220, GOVT 2225, PHIL 1950)
3. *Possible Electives (choose any four):*
 - International Development (DSOC 2050, SOC 2206)
 - Economic Development (ECON 3710)
 - Labor Markets and Income Distribution in Developing Countries (ILRIC 4350)
 - Contemporary Controversies in the Global Economy (AEM 2000)
 - Environmental Aspects of International Urban Planning (CRP 4530/6830)
 - Gender and Globalization (CRP 3650, FGSS 3600)
 - Education, Inequality, and Development (DSOC 3050)
 - Sex and Gender in Cross-Cultural Perspective (ANTHR 3421/6421, FGSS 3210/6310)

Rural Areas in Metropolitan Society (DSOC 3360)

Gender and International Development (CRP/FGSS 6140)

Social Policy and Inequality

In the modern period, inequalities generated in the market and through other social institutions are typically regarded as excessive, and the state is seen as the main tool for redistribution, discrimination abatement, equalization of life chances, and related forms of amelioration. The social policy and inequality track explores the role of the state in generating and reducing inequalities of various kinds.

1. *Overview Course (choose any one)*
2. *Controversies About Inequality* (DSOC/ILROB/PAM/SOC 2220, GOVT 2225, PHIL 1950)
3. *Possible Electives (choose any four):*
 - Organizations and Social Inequality (ILROB 6260)
 - Employment Discrimination and the Law (ILRCB 6840)
 - Human Resource Economics and Public Policy (ILRHR 3600)
 - Economics of the Public Sector (PAM 2040)
 - Introduction to Policy Analysis (PAM 2300)
 - Introduction to Public Policy (GOVT 3071)
 - Urban Politics (GOVT 3111)
 - Evolving Families: Challenges to Family Policy (PAM 3360)
 - Low-Income Families: Qualitative and Policy Perspectives (PAM 3350)
 - Risk and Opportunity Factors in Childhood and Adolescence (HD 3530)
 - Social Policy and Social Welfare (CRP 4480/5480)
 - Policy Analysis: Welfare Theory, Agriculture, and Trade (AEM 6300, ECON 4300)
 - Economic Analysis of the Welfare State (ECON 4600, ILRLE 6420)
 - Health and Social Behavior (HD 4570, SOC 4570)
 - Public Policy and the African-American Urban Community (ASRC 4605)
 - Beliefs, Attitudes, and Ideologies (PSYCH 4890/6890)
 - Research on Education Reform and Human Resource Policy (ILRHR 6601)

The Ethics of Inequality

Charges of social injustice are often charges of excessive inequality. What are the political, philosophical, and legal debates that are relevant to such judgements? Under what conditions should rich countries assist poor ones? At what point should governments step in and redistribute income? When should parents pass on their wealth to their children? The ethics of inequality track examines the conditions under which inequalities might be deemed legitimate or illegitimate, evaluates prevailing inequalities and social policy as against this yardstick, and explores the larger

role of values in popular and scholarly judgments about inequality.

1. *Overview Course: Inequality, Diversity, and Justice* (CRP/GOVT/SOC 2930, PHIL 1930)
2. *Controversies About Inequality* (DSOC/ILROB/PAM/SOC 2220, GOVT 2225, PHIL 1950)
3. *Possible Electives:*

A. Ethics Courses (choose two)

Values in Law, Economics, and Industrial Relations (ILRCB 6070)

Contemporary Moral Issues (PHIL 1450)

Global Thinking (GOVT 2947)

Modern Political Philosophy (PHIL 3460)

Feminism and Philosophy (FGSS/PHIL 2490)

B. Social Science Classes (choose two)

Select courses in consultation with advisor (see list of electives below).

Poverty and Economic Development

Over the past century, rich countries have of course become yet richer, while less developed countries remain burdened with massive poverty. The courses listed below examine the sources and causes of world poverty, the rise of global anti-inequality social movements, and the types of policy interventions that might stimulate economic development and reduce poverty.

1. *Overview Course (choose any one)*
2. *Controversies About Inequality* (DSOC/ILROB/PAM/SOC 2220, GOVT 2225, PHIL 1950)
3. *Possible Electives (choose any four):*
 - Economic Development (ECON 3710)
 - Issues in African Development (CRP 4770/6770)
 - Labor Markets and Income Distribution in Developing Countries (ILRIC 4350)
 - Health and Survival Inequalities (DSOC/FGSS/SOC 4100)
 - Applied Economic Development (ECON 3720)
 - Low-Income Families: Qualitative and Policy Perspectives (PAM 3350)
 - Gender and International Development (FGSS/CRP 6140)
 - Economics of Hunger and Malnutrition (ECON 4740, NS 4570)

Social Movements and Inequality

The history of modern society may be seen in large part as a history of anti-inequality social movements (e.g., the Enlightenment, socialism, the union movement, the civil rights movement, feminism) interspersed with occasional inequality-inducing reactions (e.g., the post-socialist transition). The social movements track examines the causes, effects, and likely future of such social movements and the reactions they spawn.

1. *Overview Course (choose any one)*
2. *Controversies About Inequality* (DSOC/ILROB/PAM 2220, GOVT 2225, PHIL 1950)

3. *Possible Electives (choose any four):*

Utopia in Theory and Practice (SOC 1150)

Social Movements (SOC 2800)

Social Movements in American Politics (AMST 3020, GOVT 3021)

States and Social Movements (GOVT 6603, SOC 6600)

Comparative Labor Movements in Latin America (ILRIC 6310)

Union Organizing (ILRCB 4000)

Theories of Industrial Relations Systems (ILRCB 6060)

Revitalizing the Labor Movement: A Comparative Perspective (GOVT 6413, ILRIC 6320)

Prisons (GOVT 3141)

Education and the Reproduction of Inequality

In the contemporary period, the study of inequality has increasingly turned on the study of formal education, as schools have become the main institutional locus for training and credentialing workers and for signaling potential employers about (putative) worker quality. The inequality and education track examines educational institutions and how they are organized, how they generate equality and inequality, and how possible institutional changes (e.g., vouchers, required testing) might affect the reproduction of inequalities.

1. *Overview Course (choose any one)*
2. *Controversies About Inequality* (DSOC/ILROB/PAM/SOC 2220, GOVT 2225, PHIL 1950)
3. *Possible Electives (choose any four):*
 - Social and Political Context of American Education (EDUC 2710, SOC 2710/5710)
 - Education, Inequality, and Development (DSOC 3050)
 - Schooling, Racial Inequality, and Public Policy in America (SOC 3570)
 - Research on Education Reform and Human Resource Policy (ILRHR 6601)
 - Education, Technology, and Productivity (ILRHR 6950)
 - Education Innovation in Africa and the Diaspora (ASRC 4601, EDUC 4590)
 - Education and Development in Africa (ASRC 6600)

Race and Ethnicity in Comparative Perspective

This program of study examines the many forms of racial and ethnic inequality as revealed across different times and places. When race and ethnicity are examined from an explicitly comparative perspective, it becomes possible to identify regularities and better understand the forces of competition, conflict, and subordination among ethnic and racial groups. The courses listed below address such issues as the causes of discrimination, the implications of residential segregation for inequality, the sources of ethnic and racial differences in income, the effects of anti-inequality reform efforts (e.g., affirmative action), and the possible futures of ethnic and racial stratification.

1. *Overview Course (choose any one)*
2. *Controversies About Inequality* (DSOC/ILROB/PAM/SOC 2220, GOVT 2225, PHIL 1950)
3. *Possible Electives (choose any four):*

A. General Courses

Introduction to American Studies: New Approaches to Understanding American Diversity, the 20th Century (AAS/AMST 1110)

Racial and Ethnic Politics (AMST/GOVT/LSP 3191)

Health and Survival Inequalities (DSOC/FGSS/SOC 4100)

Sociology of Health and Ethnic Minorities (DSOC/LSP 2200)

Prisons (GOVT/AMST 3141)

Racial and Ethnic Differentiation (PAM/SOC 3370)

Ethnicity and Identity Politics: An Anthropological Perspective (AAS 4790, ANTHR 4749)

Political Identity: Race, Ethnicity, and Nationalism (GOVT 6101)

B. Immigration and Ethnicity

Immigration and a Changing America (DSOC 2750)

Introduction to American Studies (AMST 1101)

Population Dynamics (DSOC 2010, SOC 2202)

Race and Ethnicity (SOC 1104)

Strangers and Citizens: Immigration and Labor in U.S. History (ILRCB 3020)

C. Case Studies

African–American Social and Political Thought (ASRC 2601)

African–American Women: 20th Century (AMST/FGSS/HIST 2120)

African–American Social History, 1865 to 1910: The Rural and Urban Experience (HIST 3750, ILRCB 3850)

African–American Social History, 1910 to The Present: Race, Work, and the City (HIST 3760, ILRCB 3860)

African–American Women in Slavery and Freedom (AMST/HIST 3030, FGSS 3070)

Public Policy and the African–American Urban Community (ASRC 4605)

Politics and Social Change in Southern Africa (ASRC 4603)

Afro–American Historiography (AMST/HIST 6101)

Latinos in the United States (DSOC/SOC 2650, LSP 2010)

Latinos in the United States: Colonial Period to 1898 (AMST 2599, HIST/LSP 2600)

Latinos in the United States: 1898 to the Present (AMST/HIST/LSP 2610)

Introduction to Asian American Studies (AAS 1100)

Introduction to Asian American History (AAS 2130, AMST/HIST 2640)

Asians in the Americas: A Comparative Perspective (AAS 3030, ANTHR 3703)

Introduction to American Indian Studies (AIS 1100)

The Family and Inequality

Although workers in modern labor markets are often analytically treated as independent individuals, they of course typically belong to families that pool the labor supply of their members, consume goods jointly, and serve in some circumstances as units of collective production. It might therefore be asked how the modern labor market has adapted to and evolved in the context of the family (and, obversely, how the family has responded to the market). The courses within this track explore such issues as the causes and consequences of the intrafamilial division of labor, the effects of marriage and family structure on careers, and the transmission of socioeconomic advantage from one generation to the next.

1. *Overview Course (choose any one)*
2. *Controversies About Inequality* (DSOC/ILROB/PAM/SOC 2220, GOVT 2225, PHIL 1950)
3. *Possible Electives:*
 - Work and Family in Comparative Perspective (SOC 2203)
 - Families and the Life Course (HD/SOC 2500)
 - Work-Family Policies in Comparative Perspective (PAM 3320)
 - Economics of Family Policy (PAM 6050)
 - Politics and Culture (GOVT 3633, SOC 2480)
 - Cultural Sociology (SOC 6300)

INFORMATION SCIENCE

C. Cardie, director; J. Abowd, W. Y. Arms, G. Bailey, K. Bala, L. Blume, R. Caruana, R. Constable, D. Easley, S. Edelman, E. Friedman, G. Gay, J. Gehrke, T. Gillespie, P. Ginsparg, C. Gomes, J. Halpern, J. Hancock, A. Hedge, D. Huttenlocher, T. Joachims, J. Kleinberg, C. Lagoze, L. Lee, A. Leiponen, B. Lust, M. Macy, P. Martin, T. Pinch, R. Prentice, M. Rooth, B. Selman, P. Sengers, D. Shmoys, M. Spivey, D. Strang, E. Tardos, E. Wagner, S. Wicker, D. Williamson, C. Yuan

The Major

Information Science (IS) is an interdisciplinary field that explores the design and use of information systems in a social context: the field studies the creation, representation, organization, application, and analysis of information in digital form. The focus of Information Science is on systems and their use rather than on the computing and communication technologies that underlie and sustain them. Moreover, Information Science examines the social, cultural, economic, historical, legal, and political contexts in which information systems are employed, both to inform the design of such systems and to understand their impact on individuals, social groups, and institutions.

Courses in the Information Science (IS) major are assigned to three area-based tracks:

Human-Centered Systems This area examines the relationship between humans and information, drawing from human-computer interaction and cognitive science.

Information Systems This area examines the computer science problems of representing, organizing, storing, manipulating, and accessing digital information.

Social Systems This area studies the cultural, economic, historical, legal, political, and social contexts in which digital information is a major factor.

Students must complete a set of 11 core courses: one introductory course, four courses in mathematics and statistics, and two courses from each of the three IS area-based tracks. Students must also obtain depth in two tracks—a primary and a secondary track—that together best represent their interests. In particular, completion of the major requires four advanced courses from the selected primary track and three advanced courses from the secondary track.

Requirements

Core (11 courses)

1. **Introductory (one course):**
 - INFO 1300 Introductory Design and Programming for the Web
 - Note: INFO 1301 and 1302 (no longer offered) may count together in place of 1300.
2. **Math and Statistics (four courses):**
 - MATH 1110 Calculus I
 - either MATH 2310 Linear Algebra with Applications or MATH 2210 Linear Algebra and Differential Equations
 - either INFO 2950 Mathematical Methods for Information Science or CS 2800 Discrete Structures

One of the following:

- MATH 1710 Statistical Theory and Application in the Real World
 - HADM 2201 Hospitality Quantitative Analysis
 - AEM 2100 Introductory Statistics
 - PAM 2100 Introduction to Statistics
 - ENGRD 2700 Basic Engineering Probability and Statistics
 - BTRY 3010 Statistical Methods I
 - SOC 3010 Evaluating Statistical Evidence
 - CEE 3040 Uncertainty Analysis in Engineering
 - ILRST 3120 Applied Regression Methods
 - ECON 3190 Introduction to Statistics and Probability
 - PSYCH 3500 Statistics and Research Design
3. **Human-Centered Systems (two courses):**
 - INFO 2140 Cognitive Psychology
 - INFO 2450 Communication and Technology
 4. **Information Systems (two courses):**
 - CS 2110 Object-Oriented Programming and Data Structures*

*CS 2110 is an intermediate programming course that requires prior knowledge of Java. Students who have not learned Java can take CS 1130 after completing INFO 1300 and 2300 or they can take CS 1110.

INFO 2300 Intermediate Design and Programming for the Web

5. **Social Systems (two courses):**
 - either ECON 3010 Microeconomics or ECON 3130 Intermediate Microeconomic Theory
 - one of the following: INFO 2921 Inventing an Information Society, INFO 3200 New Media and Society, INFO 3551 Computers: From the 17th Century to the Dotcom Boom, INFO 3561 Computing Cultures

Where options in the core courses exist, the choice will depend on the student's interests and planned advanced courses for the selected primary and secondary tracks.

Tracks

Students must complete four advanced courses in their primary track and three advanced courses in their secondary track, selected from those listed below.

All courses in the major must be taken for a letter grade. Students must earn a C- or better in all courses used for the major.

Courses taken to satisfy the core course requirements may not be used to fulfill the track requirements.

Additional information on Information Science courses can be found below and in the "Computing and Information Science (CIS)" section of *Courses of Study*. Course information for all other courses in the major can be found in the relevant departments (e.g., AEM, CS, STS).

Human-Centered Systems

PSYCH 3420 Human Perception: Applications to Computer Graphics, Art, and Visual Display*

INFO 3450 Human-Computer Interaction Design

PSYCH 3470 Psychology of Visual Communications

INFO 3650 Technology and Collaboration

PSYCH 3800 Social Cognition*

PSYCH 4160 Modeling Perception and Cognition

INFO 4400 Advanced Human-Computer Interaction Design

INFO 4450 Seminar in Computer-Mediated Communication

INFO 4500 Language and Technology

DEA 4700 Applied Ergonomic Methods

* Students who take PSYCH 3420 may also count its prerequisite, PSYCH 2050, toward the Human-Centered Systems primary or secondary track requirements. Similarly, students who take PSYCH 3800 may also count PSYCH 2800 toward the Human-Centered Systems primary or secondary track requirements. At most, one of PSYCH 2050 or PSYCH 2800 can be counted toward the primary or secondary track requirements.

Information Systems

INFO 3300 Data-Driven Web Applications

CS 4190 Computer Networks

LING 4424 Computational Linguistics

INFO 4300 Information Retrieval

- INFO 4310 Web Information Systems
- CS 4320 Introduction to Database Systems
- CS 4620 Introduction to Computer Graphics
- CS 4700 Foundations of Artificial Intelligence
- LING 4474 Introduction to Natural Language Processing
- ORIE 4740 Statistical Data Mining
- CS 4780 Machine Learning
- ORIE 4800 Information Technology
- CS 5150 Software Engineering
- CS 5430 System Security
- INFO 5300 Architecture of Large-Scale Information Systems
- CS 5780 Empirical Methods in Machine Learning and Data Mining

Social Systems

- INFO 2040 Networks
- SOC 3040 Social Networks and Social Processes
- INFO 3200 New Media and Society*
- AEM 3220 Internet Strategy
- INFO 3490 Media Technologies
- INFO 3551 Computers: From the 17th Century to the Dotcom Boom
- INFO 3561 Computing Cultures
- INFO 3660 History and Theory of Digital Art
- ECON 3680 Game Theory*
- INFO 3871 The Automatic Lifestyle: Consumer Culture and Technology
- STS 4111 Knowledge, Technology, and Property
- ECON 4190 Economic Decisions under Uncertainty
- INFO 4290 Copyright in a Digital Age
- INFO 4350 Seminar on Applications of Information Science
- ORIE 4350 Introduction to Game Theory*
- INFO 4144 Responsive Environments
- SOC 4150 Internet and Society*
- INFO 4470 Social and Economic Data
- INFO 4850 Computational Methods for Complex Networks
- ECON 4760/4770 Decision Theory I and II
- HADM 4489 The Law of the Internet and E-Commerce
- INFO 5150 Culture, Law, and Politics of the Internet

*Only one of ORIE 4350 and ECON 3680 may be taken for IS credit. Only one of INFO 3200 and SOC 4150 may be taken for IS credit.

Admission

All potential affiliates are reviewed on a case-by-case basis relative to the following criteria:

- Completion of four core courses, one in each of the core course areas listed above (i.e., Math and Statistics, Human-Centered systems, Information Systems, and Social Systems). Courses must be taken for a letter grade.

- A grade of C or better in each of the completed core courses with an overall GPA for these courses of 2.5 or more.

Courses used in the affiliation GPA computations may be repeated if the original course grade was below a C. The most recent grade will be used for all repeated courses. Qualifying courses must be taken at Cornell.

Honors

To qualify for departmental honors, students must apply by the end of their seventh semester and meet the GPA requirement:

- a cumulative GPA greater than or equal to 3.5

OR

- a cumulative GPA greater than or equal to 3.0 in addition to contributions to the Information Science Program through research or other means, as detailed in their application.

Students intending to pursue honors must complete the following course work in addition to their IS major courses:

- Three additional credit hours of IS course work at or above the 5000 level; (graded courses only; no seminars or 2-credit project courses)
- Six credit hours of INFO 4900 Independent Study and Research with one or more IS faculty members, spread over at least two semesters and with grades of A- or better; it is expected that the INFO 4900 research will result in a project report.

Latin designations (appended to the degree) are based on final cumulative GPA, as follows:

- cum laude, 3.50 or above
- magna cum laude, 3.75 or above
- summa cum laude, 4.00 or above

The Minor

A minor in Information Science is also available to students in the College of Arts and Sciences, CALS, AAP (Architecture and Planning students only), Engineering, Human Ecology, Hotel, and ILR. The minor has been designed to ensure that students have substantial grounding in all three tracks: Human-Centered Systems, Information Systems, and Social Systems. Detailed information about the minor can be found in the CIS section of *Courses of Study*. Students are also referred to www.infosci.cornell.edu/ugrad for the most up-to-date description of the minor and its requirements.

Courses

For complete course descriptions, see the Information Science listings under Computing and Information Science (CIS).

INFO 1300 Introductory Design and Programming for the Web (also CS 1300)
Fall. 3 credits.

For description, see INFO 1300 in CIS section.

INFO 2040 Networks (also CS 2800, ECON 2040, SOC 2090) (SBA-AS)

Spring. 4 credits.
For description, see ECON 2040.

INFO 2140 Cognitive Psychology (also COGST 2140/6140, PSYCH 2140) (KCM-AS)

Spring. 4 credits. Limited to 175 students. Prerequisite: sophomore standing. Graduate students, see INFO/PSYCH 6140. For description, see PSYCH 2140.

INFO 2300 Intermediate Design and Programming for the Web (also CS 2300)

Spring. 3 credits. Prerequisite: INFO 1300 strongly recommended. Must be taken before INFO 3300.

For description, see INFO 2300 in CIS section.

[INFO 2310 Topics in Web Programming and Design]

INFO 2450 Communication and Technology (also COMM 2450)

Fall, summer. 3 credits.
For description, see COMM 2450.

INFO 2921 Inventing an Information Society (also AMST/ECE/ENGRG 2980, HIST 2920, STS 2921) (HA-AS)

Spring. 3 credits.
For description, see ENGRG 2980.

INFO 2950 Mathematical Methods for Information Science

Spring. 4 credits. Corequisite: MATH 2310 or equivalent.
For description, see INFO 2950 in CIS section.

INFO 3200 New Media and Society (also COMM 3200)

Spring. 3 credits.
For description, see COMM 3200.

INFO 3300 Data-Driven Web Applications (also CS 3300)

Spring. 3 credits. Prerequisite: CS 2110 and (INFO 2300 or permission of instructor).
For description, see INFO 3300 in CIS section.

[INFO 3400 Psychology of Social Computing (also COMM 3400)]

Fall. 3 credits. Prerequisite: COMM/INFO 2450. Next offered 2010–2011.
For description, see COMM 3400.]

INFO 3450 Human-Computer Interaction Design (also COMM 3450)

Fall. 3 credits. Pre- or corequisite: INFO 2450.
For description, see COMM 3450.

[INFO 3490 Media Technologies (also COMM 3490, STS 3491) (HA-AS)]

Spring. 3 credits. Offered odd-numbered years; next offered 2010–2011.
For description, see COMM 3490.]

[INFO 3551 Computers: From the 17th Century to the Dotcom Boom (also COMM 3550, STS 3551) (HA-AS)]

Fall. 4 credits. Next offered 2011–2012
For description, see STS 3551.]

INFO 3561 Computing Cultures (also COMM/VISST 3560, STS 3561) (CA-AS)

Spring. 4 credits. No technical knowledge of computer use presumed or required. INFO 3551 and 3561 may be taken separately or in any order.
For description, see STS 3561.

INFO 3650 Technology and Collaboration (also COMM 3650)

Spring. 3 credits. Prerequisite: COMM/INFO 2450.
For description, see COMM 3650.

[INFO 3660 History and Theory of Digital Art (also ARTH/VISST 3650) (CA-AS)]

Fall. 4 credits. Next offered 2010-2011.
For description, see ARTH 3650.]

INFO 4290 Copyright in the Digital Age (also COMM 4290) (CA-AS)

Fall. 3 credits. Offered odd-numbered years.
For description, see COMM 4290.

INFO 4300 Information Retrieval (also CS 4300)

Fall. 3 credits. Prerequisite: CS 2110 or equivalent.
For description, see INFO 4300 in CIS section.

INFO 4302 Web Information Systems (also CS 4302)

Spring. 3 credits. Prerequisites: CS 2110 and some familiarity with web site technology.
For description, see INFO 4302 in CIS section.

[INFO 4350 Seminar on Applications of Information Science (also INFO 6350)]**INFO 4400 Advanced Human-Computer Interaction Design (also COMM 4400)**

Spring. 3 credits. Prerequisite: COMM/INFO 3450.
For description, see COMM 4400.

INFO 4450 Seminar in Computer-Mediated Communication (also COMM 4450)

Spring. 3 credits. Prerequisites: COMM/INFO 2450.
For description, see COMM 4450.

INFO 4470 Social and Economic Data (also ILRLE 4470)

Fall. 4 credits. Prerequisites: one semester of calculus, IS statistics requirement, at least one upper-level social science course, or permission of instructor.
For description, see INFO 4470 in CIS section.

INFO 4500 Language and Technology (also COMM 4500)

Spring. 3 credits. Prerequisite: COMM/INFO 2450 or permission of instructor.
For description, see COMM 4500.

INFO 4900 Independent Reading and Research

Fall, spring. 1-4 credits.
Independent reading and research for undergraduates.

[INFO 5150 Culture, Law, and Politics of the Internet]**INFO 5300 The Architecture of Large-Scale Information Systems (also CS 5300)**

Spring. 4 credits. Prerequisite: CS/INFO 3300 or CS 4320.
For description, see INFO 5300 in CIS section.

INFO 6140 Cognitive Psychology (also COGST 6140, PSYCH 2140/6140)

Spring. 4 credits.
For description, see PSYCH 6140.

INFO 6300 Advanced Language Technologies (also CS 6740)

Fall, spring. 3 credits. Prerequisites: permission of instructor. Neither CS/INFO 4300 nor CS 4740 are prerequisites.
For description, see CS 6740 in CIS section.

INFO 6341 Information Technology in Sociocultural Context (also STS 6341)

Spring. 4 credits.
For description, see INFO 6341 in CIS section.

[INFO 6350 Seminar on Applications of Information Science (also INFO 4350)]**INFO 6400 Human-Computer Interaction Design (also COMM 6400)**

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor.
For description, see COMM 6400.

INFO 6450 Seminar in Computer-Mediated Communication (also COMM 6450)

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. For description, see COMM 6450.

INFO 6500 Language and Technology (also COMM 6500)

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. For description, see COMM 6500.

[INFO 6648 Speech Synthesis (also LING 6648)]

Spring. 4 credits. Prerequisite: LING 4401, 4419, or permission of instructor. Next offered 2010-2011.
For description, see LING 6648.]

[INFO 6850 The Structure of Information Networks (also CS 6850)]**INFO 7050 Graduate Seminar**

Fall, spring. 1 credit.
For description, see INFO 7050 in CIS section.

INFO 7090 IS Colloquium

Fall, spring. 1 credit. For staff, visitors, and graduate students interested in information science.

INFO 7900 Independent Research

Fall, spring. Variable credit. Prerequisite: permission of an information science faculty member.
Independent research for M.Eng. students and pre-A exam Ph.D. students.

INFO 9900 Thesis Research

Fall, spring. Variable credit. Prerequisite: permission of an information science faculty member.
Thesis research for post-A exam Ph.D. students.

INTERNATIONAL RELATIONS MINOR

Office: 190B Uris Hall, 255-7645, www.einaudi.cornell.edu/initiatives/itc.asp, D. R. Lee (AEM), director

Objective

The International Relations (IR) minor is an interdisciplinary program for undergraduate students enrolled in any of the seven undergraduate colleges at Cornell. The IR minor provides a structured yet flexible program that enables undergraduates to take advantage of the vast resources available at the university for studying the politics, economics, history, languages, and cultures of the countries and regions of the world.

Graduates of the program have gone on to pursue further education in fields such as political science and anthropology and to

successful careers in international law, economics, agriculture, trade, finance, international development, and government service, among others. They have gone on to work in international and nongovernmental organizations, in cross-cultural affairs, in journalism, and in education.

The International Relations minor is not a major or a department, but rather a program offering a selection of courses reaching across colleges and departments. Students pursue the IR minor in addition to their regular degree. Students concentrating in international relations have majored in fields ranging from anthropology, city and regional planning, communications, economics, government, and history to natural resources, industrial and labor relations, and computer science. International course work and language study add a global and cross-cultural dimension to those majors. Some students even design an independent major in some aspect of international relations or comparative social or cultural studies. Spending a semester or year of study abroad can contribute to meeting the course requirements of the IR minor, including the language requirement.

Course Requirements

These requirements are designed to expose students to a broad range of perspectives in international relations while allowing them to tailor their course selections to specific interests. Courses throughout the university are grouped into four subject areas:

1. International Economics and Development
2. World Politics and Foreign Policy
3. Transnational Processes and Policies
4. Cultural Studies

Within these four subject areas, courses are also divided into "core" and "elective" categories. Altogether, students must complete eight courses from the four groups according to one of two options. Option A emphasizes the politics and economics of international relations. Option B puts greater stress on culture. In choosing either option, students should ensure that they acquire familiarity with more than one geographic region or country. All courses used to fulfill the minor requirements must be taken for a letter grade. Courses can count both toward a major and the International Relations minor.

Option A: One core course from each of Groups 1, 2, 3, and 4; one elective from each of Groups 1, 2, 3, and 4

Option B: One core course from each of Groups 1, 2, 3, and 4; one elective from either Group 1 or Group 2; one elective from each of Groups 3 and 4; one additional elective from either Group 3 or Group 4

Before pre-registration a course list for the following semester (as well as lists for the current and previous semesters) can be obtained from the administrative coordinator in 190B Uris Hall, as well as from the web site. Note: These lists are not necessarily complete. Other courses throughout the university qualify for the IR minor by prior arrangement.

Language Requirement

Students in the IR minor are expected to complete additional language study beyond the College of Arts and Sciences' degree

requirement (for those in Arts and Sciences). This study can be accomplished in one of two ways: (1) two years of one foreign language (proficiency plus one course that uses the language to explore some aspect of foreign culture); (2) two languages at proficiency.

Study Abroad

Students in the IR minor are encouraged to study abroad to bring a practical dimension to their expertise in international issues. Those who choose this option will find the requirements for the concentration highly compatible with courses taken abroad. Students are encouraged to contact the administrative coordinator before departure.

Completion

Transcripts will reflect successful completion of the requirements for the minor. In addition, students will receive a special certificate and a letter of confirmation signed by the director of the IR Minor and the director of the Mario Einaudi Center for International Studies.

Enrollment

To obtain course lists, to enroll and for all further information, please contact the IR administrative coordinator, Mario Einaudi Center for International Studies, 190B Uris Hall, 255-7645; irc@is.cornell.edu.

Course List for 2009–2010

Core course options (one from each group) and selected electives are listed below; other electives are possible. Most courses are offered one semester only. Offerings may change, so see the administrative coordinator, course roster, and IR web site for updates and further details.

Group 1: International Economics and Development

Core:

AEM/ECON 2300 International Trade and Finance

AEM 4290 International Finance

AEM 4300 International Trade Policy

ECON 3610 International Trade Theory

ECON 3620 International Monetary Theory and Policy

Electives:

AEM 4350 Political Economy of the WTO and Globalization

AEM 4420 Emerging Markets

AEM/ECON 4640 Economics of Agricultural Development

ANTHR 3684 Africa in the Global Economy

CRP 3270 Regional Economic Impact Analysis

CRP 4170 Economic Development: Firms, Industries, and Regions

ECON 3710 Economic Development

ECON 4690 China's Economy under Mao and Deng

GOVT 3303/ILRIC 3330 Politics of the Global North

GOVT 3393 Political Economy of Development

GOVT 3549 Capitalism, Competition, and Conflict

Group 2: World Politics and Foreign Policy

Core:

GOVT 1817 Introduction to International Relations

Electives:

AMST/HIST 3140 History of American Foreign Policy 1912–Present

ASIAN 2298/HIST 2890 The U.S.–Vietnam War

ASRC 3110 Government and Politics in Africa

ASRC 4600 Political and Social Change in Caribbean

GOVT 3313 Middle Eastern Politics

GOVT 3323 Modern European Politics

GOVT 3857 American Foreign Policy

GOVT 3867 The Causes of War

GOVT 4827 Unifying While Integrating: China and the World

HIST 2571 China Encounters the World

HIST 3710 World War II in Europe

HIST 4050 U.S.–Cuba Relations

NES 4672 Nationalisms in the Arab World

Group 3: Transnational Processes and Policies

Core:

GOVT/SOC 3937 Introduction to Peace Studies

GOVT 3957 New Forces in International Politics

Electives:

AEM 4450 Food Policy for Developing Countries

AEM/ECON 4640 Economics of Agricultural Development

CRP 3540 Introduction to Environmental Planning

CRP 3840 Green Cities

CRP 4530 Environmental Aspect of International Urban Planning

DSOC 2050/SOC 2206 International Development

DSOC 2750 Immigration and a Changing America

DSOC 3240 Environment and Society

FDSC/IARD 4020 Agriculture in the Developing Nations I

HD 4830 Early Care and Education in Global Perspective

IARD 3000 Perspectives in International Agricultural and Rural Development

IARD 4940 Special Topics in International Agriculture

ILRCB 3040 Seminar in American Labor and Social History

ILRHR 4690 Immigration and the American Labor Force

NTRES 3320 Ethics and the Environment

Group 4: Cultural Studies

Core:

ANTHR 1400 Introduction to Anthropology: The Comparison of Cultures

ANTHR 1420 Cultural Diversity and Contemporary Issues

Electives:

AAS 3030/ANTHR 3703 Asians in the Americas

AMST/ANTHR 3453 Anthropology of Colonialism

AMST/ANTHR/LSP 3777 The United States

AMST/ARTH 3605 U.S. Art from FDR to Reagan

AMST/HIST 1530 Introduction to American History

AMST/HIST 2110 Black Religious Traditions: Sacred and Secular

AMST/HIST 3450 Cultural and Intellectual Life of 19th-Century Americans

AMST/ILRCB 3060 Recent History of American Workers

ANTHR 2730 Cultures of Native North America

ANTHR 3421/FGSS 3210 Sex and Gender in Cross-Cultural Perspective

ANTHR 3516 Power, Society, Culture in Southeast Asia

ANTHR 3535 Situation of China's Minorities

ARKEO/JWST/NES 3665 Ancient Iraq II

ARTH 2350 Introduction to Art History: Islamic Art and Culture

ARTH 2400 Introduction to Art History: Renaissance and Baroque

ARTH 3202/CLASS 3740 Arts of the Roman Empire

ARTH 3510/ASRC 3501 Introduction of African Art

ASIAN 1191/HIST 1910 Introduction to Modern Asian History

ASIAN 2208 Introduction to Southeast Asia

ASIAN 2211 Introduction to Japan

ASIAN 2245/MUSIC 1341 Gamelan in Indonesian Culture

ASIAN 3385/HIST 3880 Vietnamese Histories

ASIAN 3397/HIST 3950 Premodern Southeast Asia

ASIAN 4494/HIST 4921 India: Nation and Narration, History, Literature

ASIAN 6601/HIST 4870 Seminar on Thailand

ASRC 2300 African Civilizations and Culture

ASRC 3300 African History: Earliest Times to 1800

ASRC 4601 Education Innovation in Africa and the Diaspora

ASRC 4606 Family and Society in Africa

CLASS 4625/HIST 4831/RELST 4625 Christianization/Roman World

COML 3620/ENGL 3250/HIST 3640 Culture of the Renaissance II

COML 3860 Literature and Film of South Asia

COML 4520 Renaissance Humanism

COML 4740 Topics in Modern European Intellectual History

COML 4960 Imagining the Mediterranean

ENGL 2740 Scottish Literature

ENGL 3330 The 18th-Century English Novel

ENGL 3490 Shakespeare and Europe

FGSS/HIST 2190 Women in South Asia

FGSS/SPAN 2460 Contemporary Narratives by Latina Writers

FILM 2930/NES 2793 Sophomore Seminar: Middle Eastern Cinema

FILM 3410/FREN 3360 French Film

FREN 2210 Introduction to Textual Analysis

FREN 2240 The French Experience

FREN 3210 Readings in Modern French Literature and Culture

FREN 3220 Readings in Early Modern French Literature and Culture

FREN 3700 The French Enlightenment and the Modern Citizen

HIST 1570 Introduction to Western Civilization

HIST 1950 Colonial Latin America

HIST 2910 Modern European Jewish History 1789 to 1948

HIST 3050 Britain, 1660 to 1815

HIST 3260 History of the British Empire

HIST 3490 Renaissance England, 1485 to 1660

HIST 3661 History of Southern Africa

HIST 4041 Race and Ethnicity in Latin America

HIST 4290/SPAN 4340 Cervantes' Mediterranean World

HIST 4520 History of the New Europe

ITAL 2900 Perspectives in Italian Culture

ITAL 2970 Introduction to Italian Literature

ITAL 3040 Italy after the Renaissance

JWST/NES/RELST 2675 The Religions of Ancient Israel

KRLIT 4405 Readings in Korean Literature

LSP 2010/SOC 2650 Latinos in the United States

MUSIC 3614/NES 4947-4948 Middle Eastern Music Ensemble

NES 2747 Introduction to Art History: Islamic Art

RUSSL 3369 Dostoevsky

RUSSL 4499 The Avant-Garde in Russian Literature and the Arts

SOC 4780 Family and Society in Africa

SPAN 2140 The Spanish Difference: Readings in Modern Iberian Literatures

SPAN 2170 Early Hispanic Modernities

SPAN 2230 Perspectives on Spain

SPAN 3010 Hispanic Theater Production

THETR 3090 Modern Arabic Drama

ITALIAN

See "Department of Romance Studies."

JAPANESE

See "Department of Asian Studies."

JAVANESE

See "Department of Asian Studies."

PROGRAM OF JEWISH STUDIES

D. Starr, director (modern Hebrew and Arabic Literature; Critical Theory, Middle Eastern Film), L. Adelson (German-Jewish Literature and Culture), R. Brann (Judeo-Islamic Studies), V. Caron (Modern French and European-Jewish History), M. Diesing (Yiddish Language and Linguistics), Z. Fahmy (Modern Middle Eastern History), K. Haines-Eitzen (Early Judaism and Early Christianity), R. Hoffmann (Holocaust Studies), P. Hohendahl (German Literature), P. Hyams (Medieval Jewish History), D. LaCapra (Holocaust Studies), M. Migiel (Italian Literature), C. Monroe (Near Eastern Mediterranean Studies; Nautical Archaeology), L. Monroe (Hebrew Bible Studies), D. I. Owen (Ancient Near Eastern History and Archaeology; Assyriology; Biblical History and Archaeology), R. Polenberg (American-Jewish History), E. Rebillard (Jews in the Roman Empire), N. Scharf (Hebrew Language), D. Schwarz (Anglo-Jewish Literature), G. Shapiro (Russian-Jewish Literature), S. Shoer (Hebrew Language), P. Stevens (curator), Emeritus: D. Bathrick, N. Furman, J. Porte, E. Rosenberg, Y. Szekely.

The Program of Jewish Studies was founded as an extension of the Department of Semitic Languages and Literatures, now the Department of Near Eastern Studies, in 1973 and attained status as an intercollegiate program in 1976.

The program has grown out of the conviction that Judaic civilization merits its own comprehensive and thorough treatment and that proper understanding of any culture is inconceivable without adequate knowledge of the language, literature, and history of the people that created it. Accordingly, the offerings in the areas of Jewish languages and literatures have been considerably expanded, and courses in ancient, medieval, and especially modern Jewish history and culture have been added to the program.

It is a broadly based, interdisciplinary program, bringing together faculty from various Cornell departments and colleges.

The Program of Jewish Studies supports teaching and research in the many areas of Jewish Studies. It is a secular, academic program, whose interests are diverse and cross-cultural. The program recognizes its special relationship to teaching and research in classical Judaica and Hebraica pursued by the members of the Department of Near Eastern Studies, with particular emphasis on the interrelationship between Judaism, Christianity, and Islam.

It presently enables students to obtain basic instruction and specialization in the fields of Semitic languages; the Hebrew Bible; medieval and modern Hebrew literature; ancient, medieval, and modern European and Middle Eastern Jewish history; and Holocaust studies. In some of these fields students may take courses on both graduate and undergraduate levels. Faculty throughout the university provide breadth to the program by offering courses in related areas of study.

For more information, please visit www.arts.cornell.edu/jwst/index.html.

Courses Offered

JWST 1101-1102 Elementary Modern Hebrew I and II (also NES 1101-1102)
1101, fall; 1102, spring. 4 credits. Letter grades only. S. Shoer and N. Scharf.
For description, see NES 1101-1102.

JWST 1103 Elementary Modern Hebrew III (also NES 1103)
Fall. 4 credits. N. Scharf and S. Shoer.
For description, see NES 1103.

JWST 1104 Beginners Intensive Hebrew (also NES 1104)
Summer. 3 credits. S. Shoer.
For description, see NES 1104.

JWST 1105 Hebrew Summer Follow-Up (also NES 1105)
Fall. 1 credit. S. Shoer.
For description, see NES 1105.

JWST 2100 Intermediate Modern Hebrew: Special Topics in Hebrew (also NES 2100) @
Spring. 4 credits. *Satisfies Option 1.*
N. Scharf.
For description, see NES 2100.

[JWST 2271 Yiddish Linguistics (also LING 2241) (SBA-AS)]
Spring. 4 credits. Next offered 2010-2011.
M. Diesing.
For description, see LING 2241.]

[JWST 2350 Antisemitism and Crisis Modernity (also HIST 2350) (HA-AS)]
Fall. 4 credits. Next offered 2010-2011.
V. Caron.]

JWST 2611 Prophecy in Ancient Israel (also NES/RELST 2611)
Spring. 3 credits. L. Monroe.
For description, see NES 2611.

JWST 2629 Introduction to New Testament and Other Early Christian Literature (also NES/RELST/CLASS 2613) @ # (HA-AS)
Spring. 3 credits. K. Haines-Eitzen.
For description, see NES 2629.

[JWST 2651 Holy War, Crusade, and Jihad in Judaism, Christianity, and Islam (also COML 2310, HIST 2691, NES 2651) @ # (HA-AS)]
Fall. 3 credits. Next offered 2010-2011.
R. Brann.]

JWST 2661 Ancient Ships and Seafaring—Introduction to Nautical Archaeology (also ARKEO/NES 2661) @ # (HA-AS)
Fall. 4 credits. C. Monroe.
For description, see NES 2661.

JWST 2668 Ancient Egyptian Civilization (also ARKEO/NES 2668) @ # (HA-AS)
Spring 3 credits. C. Monroe.
For description, see NES 2668.

JWST 2674 History of the Modern Middle East: 19th-20th Centuries (also GOVT 2747, HIST/NES 2674) @ # (HA-AS)
Fall. 3 credits. Z. Fahmy.
For description, see NES 2674.

JWST 2724 Introduction to the Hebrew Bible (also NES/RELST 2624) @ # (LA-AS)
Fall. 3 credits. L. Monroe.
For description, see NES 2724.

[JWST 2793 Middle Eastern Cinema (also FILM 2930, NES 2793, VISST 2193) @ (LA-AS)]
Fall. 4 credits. Next offered 2010-2011.
D. Starr.]

JWST 2920 Modern European Jewish History 1789–1948 (also NES 2620, HIST 2910)

Fall. 4 credits. S. Gutman.
For description, see HIST 2910.

JWST 3101 Advanced Intermediate Modern Hebrew: Aspects of Israeli Society (also NES 3101) @

Fall. 4 credits. N. Scharf.
For description, see NES 3101.

JWST 3102 Advanced Intermediate Hebrew II: Aspects of Israeli Culture (also NES 3102) @

Spring. 4 credits. N. Scharf.
For description, see NES 3102.

[JWST 3103 Love, Wine, Death, and In Between (also NES 3103) @ # (CA-AS)

Fall. 4 credits. Next offered 2010–2011.
S. Shoer.
For description, see NES 3103.]

JWST 3105 Intensive Conversational Hebrew (also NES 3105)

Fall. 2 credits. Limited to 15 students.
Prerequisite: NES 3102, 4100, or permission of instructor; non-native speakers only.
N. Scharf.
For description, see NES 3105.

[JWST 3524/6524 Israelite Prophecy (also RELST/NES 3524) @ # (LA-AS)

Spring. 4 credits. Next offered 2010–2011.
L. Monroe.
For description, see NES 3524.]

JWST 3588 Biblical Archaeology (also NES/RELST 3588)

Spring. 4 credits. L. Monroe.
For description, see NES 3588.

[JWST 3619 Near Eastern Christianities, 50–650 CE (also HIST/NES/RELST 3619) @ # (HA-AS)

Fall. 4 credits. Next offered 2010–2011.
K. Haines-Eitzen.
For description, see NES 3619.]

JWST 3625 Introduction to the Hebrew Bible—Seminar (also NES/RELST 3625)

Fall. 4 credits. L. Monroe.
For description, see NES 3625.

JWST 3629 Introduction to New Testament and Other Early Christian Literature (also NES/CLASS/ RELST 3629)

Spring. 1 credit. Prerequisite: concurrent or past enrollment in NES 2629 or one year of ancient Greek. K. Haines-Eitzen.
For description, see NES 3629.

[JWST 3661 Sumerian Language and Culture I (also ARKEO/NES 3661/6661, JWST 6661) @ # (HA-AS)

Fall. 4 credits. Next offered 2010–2011.
D. I. Owen.
For description, see NES 3661.]

[JWST 3665 Ancient Iraq II (also ARKEO/NES 3665) @ # (HA-AS)

Fall. 4 credits. Next offered 2010–2011.
D. I. Owen.]

[JWST 3666 History and Archaeology of the Ancient Near East (also ARKEO/NES 3666/6666, JWST 6666) @ # (HA-AS)

Fall. 4 credits. Next offered 2010–2011.
D. I. Owen.
For description, see NES 3666.]

JWST 3697 Israeli–Palestinian Conflict (also GOVT 3977, NES 3697, HIST/SOC 3970) @ (HA-AS)

Spring. 4 credits. R. Brann.
For description, see NES 3697.

JWST 3700 History of the Holocaust (also HIST 3700) (HA-AS)

Spring. 4 credits. Next offered 2010–2011.
V. Caron.

JWST 3799 Imagining the Other: Jews and Arabs in Contemporary Literature and Film (also COML/NES 3799) @ (LA-AS)

Fall. 4 credits. D. Starr.
For description, see NES 3799.

[JWST 4100 Advanced Readings in Modern Hebrew (also NES 4100)

Fall. 4 credits. Limited to 15 students. Next offered 2010–2011. D. Starr.]

[JWST 4101 Modern Hebrew Literature (also NES 4101) @ (LA-AS)

Spring. 4 credits. Next offered 2010–2011.
D. Starr.
For description, see NES 4101.]

JWST 4102 Biblical Hebrew Prose—Genesis (also NES/RELST 4102) @ # (LA-AS)

Fall. 4 credits. L. Monroe.
For description, see NES 4102.

JWST 4170 History of Jews: Modern France (also HIST 4170) (HA-AS)

Spring. 4 credits. V. Caron.
For description, see HIST 4170.

[JWST 4540 Maimonides and Averroes (also NES/RELST 4540, SPAN 4380) @ # (CA-AS)

Spring. 4 credits. Next offered 2010–2011.
R. Brann.
For description, see NES 4540.]

JWST 4550 The World of the Phoenicians (also HIST 4552, NES 4550)

Spring. 4 credits. C. Monroe.
For description, see NES 4550.

JWST 4580 Imagining the Holocaust (also COML 4830, ENGL 4580, GERST 4570) (LA-AS)

Spring. 4 credits. D. Schwarz.
For description, see ENGL 4580.

[JWST 4644 Late Bronze Age World of Ugarit (also ARKEO/HIST/NES 4644/6644, CLASS 4744/7744, JWST 6644) @ # (HA-AS)

Spring. 4 credits. Next offered 2010–2011.
C. Monroe.
For description, see NES 4644.]

[JWST 4670 Wealth and Power in Early Civilizations (also NES 4670) @ # (HA-AS)

Fall. 4 credits. Next offered 2010–2011.
C. Monroe.
For description, see NES 4670.]

JWST 4674 Topics in Modern European Intellectual and Cultural History (also COML/HIST 4740)

Fall. 4 credits. D. LaCapra.
For description, see HIST 4740.

JWST 4738 Imagining the Mediterranean (also COML 4960, NES 4738) @ (LA-AS)

Spring. 4 credits. G. Holst-Warhaft.
For description, see NES 4738.

JWST 4784 Israeli Nation: Self and Literature (also NES 4784)

Spring. 4 credits. D. Starr.
For description, see NES 4784.

[JWST 4903 Methods in the Study of the Ancient Near East (also ARKEO/NES 4903)

Spring. 4 credits. Next offered 2010–2011.
D. I. Owen.
For description, see NES 4903.]

JWST 4991–4992 Independent Study—Undergraduate

Fall and spring. Variable credit. Staff.

[JWST 6112 Readings in Medieval Hebrew Poetry and Prose (also NES 6112)

Fall. 4 credits. Next offered 2010–2011.
R. Brann.]

JWST 6150 Jews in German Culture since 1945 (also GERST 6150)

Spring. 4 credits. L. Adelson.
For description, see GERST 6150.

JWST 6642 Topics in Ancient History (also HIST 6300, NES 6642, CLASS 7682)

Spring. 4 credits. E. Rebillard.
Topic: Sharing the City: Pagans, Jews and Christians in Late Antiquity. For description, see CLASS 7682.

JOHN S. KNIGHT INSTITUTE FOR WRITING IN THE DISCIPLINES

The director of the John S. Knight Institute is Paul Lincoln Sawyer, professor in the Department of English. Katherine Gottschalk, senior lecturer in the Department of English, is the Walter C. Teagle Director of First-Year Writing Seminars. The institute's offices are in 101 McGraw Hall, 255–4061.

T. Carrick (Writing Workshop), D. Evans (Writing Workshop), D. Faulkner (Writing Workshop), K. Hjortshoj (Writing in the Majors), J. Martin (Writing Workshop), J. Pierpont (Writing Workshop), E. Shapiro (Writing in the Majors).

The John S. Knight Institute helps to coordinate the teaching of writing in all undergraduate schools and colleges (the School of Industrial and Labor Relations; the School of Hotel Administration; and the colleges of Agriculture and Life Sciences; Architecture, Art, and Planning; Arts and Sciences; Engineering; and Human Ecology). The program administers writing seminars for first-year and upperclass students, discipline-based seminars in its Writing in the Majors Program, tutorial writing classes, and seminars in the teaching of writing. More than 30 academic departments and programs participate in the program.

First-Year Writing Seminars

For first-year students the Institute offers the First-Year Writing Seminars—more than 125 different courses in the humanities, social sciences, expressive arts, and sciences. Through introductory work in a particular field of study, seminars help students write good English expository prose—prose that, at its best, is characterized by clarity, coherence, intellectual force, and stylistic control. All seminars pursue this common aim through

small classes and adherence to a program-wide set of guidelines:

- Seminars should require at least six—and at most nine—formal essays on new topics, totaling 25–30 pages of polished prose.
- No fewer than three of the six to nine required essays should go through a process of development under the instructor's guidance (e.g., revision, peer review, responses to readings, conferences).
- All seminars should spend ample classroom time on work directly related to writing.
- Reading assignments in the course subject should be kept under ca. 75 pages per week to permit regular, concentrated work on writing.
- All students should meet in at least two individual conferences with the instructor.

Offerings change from semester to semester. Each semester's First-Year Writing Seminars are described on the web at <https://fws.arts.cornell.edu>.

First-Year Writing Seminars aim to ensure that students will enjoy the benefits of small classes. Instead of pre-enrolling in their writing courses, students request placement in one of five writing seminars by filling out an electronic ballot in August for the fall semester and in November for the spring semester. Over 90 percent receive one of their top three choices. After placement by ballot, students may change their writing seminars via electronic add and drop. Writing seminars may be added only during the first two weeks of each semester.

The colleges and the schools served by the Institute accept First-Year Writing Seminars in fulfillment of their individual graduation requirements in categories referred to variously as “first-year writing,” “oral and written expression,” and the like. The Institute does not decide whether students may graduate: it makes courses available. Individual colleges and schools administer their own graduation requirements.

Currently, most undergraduate students are required to take two First-Year Writing Seminars. Architecture majors, however, need only one. Hotel students fulfill their requirement in one semester, through HADM 1165 in one semester plus one First-Year Writing Seminar in the other. Agriculture and Life Sciences students can take First-Year Writing Seminars or choose from among a variety of other courses to fulfill their requirement.

All students who score 5 on the Princeton Advanced Placement Examination in English receive 3 credits. Such credits are awarded automatically; no application to the John S. Knight Institute or the Department of English is necessary. How these credits may be applied to first-year writing or other distribution requirements depends on the student's college and score. All students who score 5, except Architecture majors, may apply their 3 credits toward the writing requirements of their college. Of students who score 4, only Agriculture and Life Sciences students may apply their 3 credits toward the writing requirements of their college. Students should always consult their college registrars to be

certain that they understand their writing requirements.

Students who have already taken a First-Year Writing Seminar, or who score 4 or 5 on the Princeton AP exam, or 700 or better on the English Composition or CEEB tests, may enroll, space permitting, in the following upper-level First-Year Writing Seminars: ENGL 2700, 2710, or 2720.

Although there are no exemptions from college writing requirements, some students may fulfill all or part of their college's writing requirement through transfer credits or writing-course substitutions.

For work done at other institutions to be accepted as equivalent to First-Year Writing Seminars, students should demonstrate that they have done a reasonably equivalent amount of writing in a formal course (e.g., it is not sufficient to write one 30-page term paper.) Students in the College of Engineering and the College of Arts and Sciences must file an “application for transfer evaluation” to request writing credit for such courses; students in other colleges should consult their college registrars.

In unusual circumstances, upper-level students may petition to use a Cornell writing course other than a First-Year Writing Seminar to satisfy part of their writing requirement. The John S. Knight Institute must approve all such petitions in advance.

For information about the requirements for First-Year Writing Seminars and descriptions of seminar offerings, see the John S. Knight Institute web site at www.arts.cornell.edu/knight_institute.

English 2880–2890: Expository Writing

Helps students write with more confidence and skill in all disciplines. Open to Cornell sophomores, juniors, and seniors, ENGL 2880–2890 courses explore themes shaped by a genre or use of expository writing, by the common concerns of several disciplines, or by an interdisciplinary topic intimately related to the written medium. Although English department instructors make up roughly half the staff, the Knight Institute's involvement enables the course to extend and diversify its offerings in separately defined, 16-member sections that appeal to the varied interests and needs of students in many areas of study. Students may choose among a variety of sections focusing on such themes as “Teens Gone Wild: The Invention of Adolescence,” “Free Speech in the 21st Century,” and “TV Nation: Television and Identity in America.” All staff are selected because their special interests and their training and experience in First-Year Writing Seminars promise original course design and superior performance.

Writing in the Majors

Spanning the humanities, social sciences, and sciences, the Knight Institute's upper-level, Writing in the Majors courses do not satisfy formal writing requirements, and faculty participation is entirely voluntary. While all Writing in the Majors courses include extensive writing, usually with guided revision, they also emphasize other forms of active, interactive learning essential to scholarship and careers in the disciplines. Writing in the Majors initiatives have included individual and collaborative research projects, collaborative writing, oral presentations, group

oral exams, field studies, authentic student-designed laboratory experiments, debates, analytical and critical reading exercises, topical symposia, conversation groups, student-led discussions, poster sessions, and many kinds of informal writing, including online exchanges. Varying radically in design and size, from enrollments of fewer than 10 students to more than 300, Writing in the Majors courses over the past 20 years have involved collaboration with 150 faculty members and more than 250 graduate teaching assistants to enrich learning in 75 upper-level courses offered in 24 departments. Since 2007–2008, the Knight Institute has substantially increased the number of Writing in the Majors courses offered at the 2000 level. These courses are intended to provide students who are still in the early stages of their academic careers with opportunities to engage with disciplinary subject matter through writing.

WRIT 7101 Writing in the Majors Seminar

Fall and spring. 1 credit. S–U grades only. Teaching assistants assigned to Writing in the Majors projects enroll in a six-week course on teaching strategies in advanced instruction.

Courses in Community Literacy

Writing outreach has become an increasingly important feature of writing programs in various campuses. Cornell's rich opportunities in service learning are formed on the assumption that learning by doing has a valid place in a university curriculum; they include volunteer activities and for-credit courses that span colleges and departments, as well as a concentration in Public Service Scholarship, which is sponsored by the Public Service Center. The courses listed below all concern writing as an interaction with community members outside Cornell, in the form of oral interviews, mentoring, or other collaborative work. For other writing courses with outreach components, see the First-Year Writing Seminar WRIT 1400 Common Ground: Cornell and Ithaca Students in Collaboration and ENGL 2890.106 Fieldwriting: Telling Community Stories, a section of ENGL 2890 Expository Writing. For opportunities to receive training and practice as a writing tutor working with Cornell undergrads, contact Tracy Hamler Carrick, director of the Writing Walk-In Service.

[WRIT 4100 Learning Behind Bars

4 credits. Next offered 2010–2011.

P. Sawyer.

A service learning course offered in conjunction with the Basic Writing course of the Prison Education Project. Course work includes tutoring inmates once a week at Auburn Correctional Facility in addition to regular class meetings at Cornell.]

WRIT 4130 Service Learning and Democratic Citizenship: The Literature of Social Action and Social Vision

Spring. 3 credits. D. Evans.

To what extent is civic engagement fundamental to democratic citizenship? This course seeks to answer that question by exploring the components of service learning as a discipline and to strengthen the intellectual foundation of students who wish to incorporate civic engagement into their curriculum. Students will become familiar with the history of service learning, explore competing theories of social justice and social

inequality, and develop a framework for social action that exists at the juncture of theory and practice. Readings will include texts by Dewey, Freire, bell hooks, Franklin, Jefferson, Thoreau, Addams, Baldwin, King, Dorothy Day, and Fanon. Weekly seminar papers as well as a term paper through which students develop their own philosophy of civic engagement.

WRIT 4180 Audio Documentary

Spring. 3 credits. A. Hammer.
For description, see LA 4180.

Teaching Writing

Each summer and fall, the institute offers instruction in the teaching of writing to new staff members in the First-Year Writing Seminars and other interested instructors. Teaching Writing, offered in the summer or fall, is primarily a course for graduate students. The program also sponsors a summer apprenticeship program for a limited number of graduate students, and a summer seminar for faculty members interested in the teaching of writing.

WRIT 7100 Teaching Writing

Summer and fall. 1 credit. S–U grades only. Prepares graduate instructors of Cornell's First-Year Writing Seminars to teach courses that both introduce undergraduates to particular fields of study and help them develop writing skills they will need throughout their undergraduate careers. Seminar discussions and readings on pedagogical theories and practices provide an overview of the teaching of writing within a disciplinary context. As part of the course, participants develop written assignments designed to be used in their own First-Year Writing Seminars.

Writing Workshop

The John S. Knight Institute offers "An Introduction to Writing in the University" for first-year students (or transfer students needing writing credit) through the Writing Workshop. This course is designed for students who have had little training in composition or who have serious difficulty with writing assignments.

WRIT 1370 and 1380 are graded S–U only, and students receiving a grade of S are granted credit toward their college writing requirements. Students who think this course might be appropriate including non-native speakers of English scoring less than 600 on the Test of English as a Foreign Language (TOEFL) should attend the assessment sessions offered by the Writing Workshop during orientation week each fall. The workshop also offers a Walk-In Service (see below) to help students work on writing assignments. The director is Joe Martin, senior lecturer in the Writing Workshop. The workshop offices are in 174 Rockefeller Hall, 255-6349.

The Writing Walk-In Service

Through the Writing Walk-In Service, the Writing Workshop offers tutoring assistance in writing to any student who needs help with a writing project. The Writing Walk-In Service has tutors available during the academic year in 174 Rockefeller Hall and North and West Campus residential areas. The director is Tracy Carrick. For information, contact the Writing Workshop, 174 Rockefeller Hall, 255-6349.

WRIT 1137-1138, 1134 An Introduction to Writing in the University

1137, fall; 1138, spring; 1134, summer. 3 credits each semester. Limited to 12 students per sec in fall and spring, 6 in summer. Prerequisite: permission of instructor. S–U grades only.

Writing seminar designed for students who need more focused attention to master the expectations of academic writing. Emphasizes the analytic and argumentative writing and critical reading essential for university-level work. With small classes and weekly student/teacher conferences, each section is shaped to respond to the needs of students in that particular class.

WRIT 1139 Special Topics in Writing

Fall and spring. 3 credits. Cannot fulfill writing or distribution requirements.

Prerequisites: undergraduate standing; permission of instructor. S–U grades only.

These courses allow students the opportunity to resolve significant writing challenges that have interfered with their academic progress. Students must have ongoing writing projects on which to work. Instruction is in weekly tutorials. Interested students should go to 174 Rockefeller for more information.

WRIT 7102 Graduate Writing Workshop

Fall and spring. 3 credits. Limited to 10 students per sec. Prerequisites: graduate standing; permission of instructor. S–U grades only.

Gives graduate students the opportunity to resolve significant writing challenges that have interfered with their academic progress. Students must have ongoing writing projects to work on. Instruction is in weekly tutorials. Interested students should go to 174 Rockefeller Hall for further information.

WRIT 7103 Work in Progress

Fall and spring. 3 credits. Limited to 10 students per sec. Prerequisites: graduate standing; permission of instructor. S–U grades only.

Writing seminar for graduate students who have substantial work in progress, such as professional articles, theses, or dissertations. In the first two weeks students discuss rhetorical and stylistic features of scholarly writing and methods of composing and revising, with relevant readings. Remaining weeks emphasize exchange and discussion of drafts, supplemented by individual conferences. The course goal is the improvement and completion of student writing projects.

KHMER (CAMBODIAN)

See "Department of Asian Studies."

KOREAN

See "Department of Asian Studies."

LATIN AMERICAN STUDIES PROGRAM

190 Uris Hall

Debra Ann Castillo, Romance Studies; Comparative Literature, Director, Latin American Studies; Lourdes Benería, City and Regional Planning; David Block, Library; Bruno Bosteels, Romance Studies; Maria

Lorena Cook, ILR, Collective Bargaining; Law and History; Raymond Craib, History; Martin De Santos, Development Sociology; Maria Fernandez, History of Art; Gary Fields, International Labor Relations; Economics; Gustavo Flores-Macias, Development Sociology; Maria Antonia Garcés, Romance Studies; Maria Cristina García, History; Frederic Gleach, Anthropology; William W. Goldsmith, City and Regional Planning; Angela Gonzales, Development Sociology; John S. Henderson, Anthropology; Luz Horne, Romance Studies; Eduardo Iñigo-Elias, Laboratory of Ornithology; Steven Kyle, Applied Economics and Management; Cecilia Lawless, Romance Studies; Luis Morato-Peña, Romance Studies; Jura Oliveira, Romance Studies; Pilar Parra, Human Ecology, Nutritional Science; Edmundo Paz Soldán, Romance Studies; Pedro David Perez, Applied Economics and Management; Mary Kay Redmond, Romance Studies; Kenneth Roberts, Government; Eloy Rodriguez, Plant Biology; Jeannine Routier-Pucci, Romance Studies; Arturo Sanchez, City and Regional Planning; Vilma Santiago-Irizarry, Anthropology; Rebecca Stoltzfus, Nutrition; Monroe Weber-Shirk, Civil and Environmental Engineering; Stephen Younger, Human Ecology Nutritional Science.

Cornell's Latin American Studies Program (LASP), founded in 1961, has become one of the nation's premier Latin American centers. Today, as part of the Mario Einaudi Center for International Studies, LASP provides a focus for all activities on the Cornell campus oriented toward Latin America. Latin Americanists are active in most of Cornell's colleges and schools, with diverse strengths including agricultural sciences, anthropology, art history, city and regional planning, government, history, labor relations, languages, literature and nutrition.

LASP's mission is to stimulate learning about Latin America by supporting Cornell's Latin America curriculum; nurturing faculty and student research; sponsoring events on and off campus; sponsoring visiting scholars from Latin America; and establishing relationships with universities and other institutions in Latin America. LASP offers a minor in Latin American Studies for undergraduate and graduate students, fellowships, summer programs, and more.

Undergraduate Minor

The undergraduate minor in Latin American Studies is earned with a minimum of 15 credits in Latin American Studies courses and with acquired facility in Spanish or Portuguese. Language facility is demonstrated by successful completion of SPAN 2190 or PORT 2190 or the equivalent. Course selections must represent at least three fields, including one at an advanced level. The complete list of approved courses is available at <http://einaudi.cornell.edu/academics>. This list includes all LATA courses and others across colleges and schools with at least 50 percent Latin American content.

Courses

LATA 1950 Colonial Latin America (also AIS/HIST 1950) @ # (HA-AS)

Fall 4 credits. R. Craib.

For description, see HIST 1950.

LATA 1960 Modern Latin America (also HIST 1960) @ (HA-AS)

Spring, 4 credits. R. Craib.
For description, see HIST 1960.

LATA 2150 The Tradition of Rupture (also SPAN 2150)

Fall, spring, 4 credits. Fall: M. A. Garcés;
spring: J. Pinet.
For description, see SPAN 2150.

LATA 2170 Readings—Medieval/Early Mod Sp (also SPAN 2170) @ (LA-AS)

Fall, 4 credits. M. A. Garcés.
For description, see SPAN 2170.

LATA 2200 Perspectives on Latin America (also SPAN 2200) @ (CA-AS)

Spring, 3 credits. B. Bosteels and
C. Lawless.
For description, see SPAN 2200.

LATA 2308 Caribbean History (also ASRC 2308) (HA-AS)

Fall, 4 credits. J. Byfield.
For description, see ASRC 2308.

LATA 3010 Hispanic Theater Production (also SPAN 3010)

Fall, 1-3 credits. D. Castillo.
For description, see SPAN 3010.

LATA 3020 Spanish in the Disciplines (also SPAN 3020)

Fall and spring, 1 credit. Staff. Sections will be offered with the following courses in 2009-2010: AEM 1102, ECON 1102, HIST 1950, IARD 4010, IARD 6010, MUSIC 3633, SPAN 2200.
For description see SPAN 3020.

LATA 3256 Archaeology of the Andes (also ANTHR/ARKEO 3256) @ # (HA-AS)

Spring, 4 credits. J. Henderson.
For description, see ARKEO 3256.

LATA 3290 Comparative Politics of Latin America (also GOVT 3293) @ (SBA-AS)

Fall, 4 credits. K. Roberts.
For description, see GOVT 3293.

LATA 3390 Political Economy of Mexico (also ILRIC 3390)

Spring, 4 credits. M. Cook.
For description, see ILRIC 3390.

LATA 3600 Autobiographical Narrative and the Cuban Socialist Revolution (also SPAN 3600) (LA-AS)

Fall, 4 credits. G. Aching.
For description, see SPAN 3600.

LATA 3650 Gender and Globalization (also CRP 3650/FGSS 3600) (SBA-AS)

Fall, 3 credits. L. Benería.
For description, see CRP 3650.

[LATA 3680 Modern and Contemporary Latin American Art (also ARTH 3550, LSP 3551) (HA-AS)]

Spring, 4 credits. M. Fernandez.
For description, see ARTH 3680.

LATA 3734 Brazil: Many Cultures, One Nation (also ANTHR 3734) @ (CA-AS)

Spring, 4 credits. J. Fajans.
For description, see ANTHR 3734.

LATA 3760 Latino/Latin American Cities (also CRP 3760)

Fall, 3 credits. A. Sanchez.
For description, see CRP 3760.

LATA 4010 Experience Latin America I (also IARD 4010)

Fall, 2 credits. D. Castillo and T. Tucker.
For description see IARD 4010.

LATA 4310 Migrant Workers (also LSP/HIST 4310) (HA-AS)

Spring, 4 credits. R. Craib.
For description see LSP 4310.

LATA 4350 Labor Markets and Income Distribution in Developing Countries (also ILRIC 4350)

Spring, 4 credits. G. Fields.
For description, see ILRIC 4350.

LATA 4940 Special Topic in Latin America (also IARD 4940)

Summer, 1-3 credits. D. Castillo.
For description see IARD 4940.

LATA 4960 International Internship in Latin America (also IARD 4960)

All semesters, 1-6 credits. D. Castillo.
For description see IARD 4960.

LATA 4970 Independent Study in LATA (also IARD 4970)

All semesters, 1-3 credits. Staff.

LATA 5190 Urban Theory and Spatial Development (also CRP 5190)

Spring, 3 credits. W. W. Goldsmith.
For description, see CRP 5190.

LATA 6000 Contemporary Issues in Latin America (also ANTHR 6200)

Fall and spring, 1 credit. Director, Latin American Studies Program.
An exploration of critical topics in the anthropology, art, economics, history, literature, political science, and sociology of Latin America. Course features guest speakers from Cornell and other institutions.

LATA 6010 Experience Latin America II (also IARD 6010)

Spring, 3 credits. D. Castillo and T. Tucker.
For description see IARD 6010.

LATA 6256 Maya History (also ANTHR/ARKEO 6256)

Fall, 4 credits. J. Henderson.
For description, see ANTHR 6256.

LATA 6310 Comparative Labor Movements in Latin America (also ILRIC 6310)

Fall, 4 credits. M. Cook.
For description, see ILRIC 6310.

LATA 6481 Seminar in Latin American History (also HIST 6481)

Fall, 4 credits. R. Craib.
For description, see HIST 6481.

LATA 6600 Brazilian Literature Since 1850s (also PORT 6600)

Fall, 4 credits. L. Horne.
For description, see PORT 6600.

LATA 6740 Transformations in the Global South (also CRP 6740)

Spring, 4 credits. W. W. Goldsmith.
For description, see CRP 6740.

LATA 6760 Latino/Latin American Cities (also CRP 6760)

Fall, 3 credits. A. Sanchez.
For description, see CRP 6760.

LATA 7390 Political Economy of Mexico (also ILRIC 7390)

Spring, 4 credits. M. Cook.
For description, see ILRIC 7390.

LATINO STUDIES PROGRAM

434 Rockefeller Hall

Undergraduate Minor

The Latino Studies Program offers an interdisciplinary undergraduate minor in Latino studies, with courses drawn from history, sociology, anthropology, literature, and language, but the program also cross-lists courses from other colleges.

- To complete the minor, students must take at least five courses (a minimum of 15 credits) in Latino Studies, including a core course, Latinos in the United States (DSOC 2650, LSP 2010, and SOC 2650), which is offered each spring semester.
- Students are required to include at least three courses from Groups I and II (one from each group, and another from either group). Of the three courses, two must be at the 3000 or 4000 level.

One elective course (see list below) can count toward the minor. Courses must be completed with a letter grade of C or above. Independent studies and first-year writing seminars do not count toward minor requirements. The list varies each semester in accordance with faculty schedules and visiting appointments.

Group I: Humanities

- LSP 2250 The United States-Mexico Border: History, Culture, Representation (also AMST/HIST 2250)
- LSP 2400 Intro to Latina/o Literature (also AMST 2401, ENGL 2400)
- LSP 2460 Contemporary Narratives by Latina Writers (also FGSS/SPAN 2460)
- LSP 2480 Poetry of the Latina/o Experience (also SPAN 2480)
- LSP 2600 Latinos in the United States: Colonial Period to 1898 (also AMST 2599, HIST 2600)
- LSP 2610 Latinos in the United States: 1898 to the Present (also AMST/HIST 2610)
- LSP 2640 Survey in U.S.-Latino Literature (also AMST 2641, ENGL 2640)
- LSP 3930 Contemporary Latino Writers (also SPAN 3930)
- LSP 3980 Latina/o Popular Culture (also AMST 3981, ENGL 3780)
- LSP 4130 Classics of Latina/o Literature (also SPAN 4130)
- LSP 4301 Queering Latinidad (also ENGL/AMST 4301)
- LSP 4620 Senior Seminar in Latina/o Studies: Chicana Feminism in a Globalizing World (also ENGL 4620)

Group II: Social Sciences

- LSP 2010 Latinos in the United States (also DSOC/SOC 2650)
- LSP 2200 Sociology of Health and Ethnic Minorities (also DSOC 2200)
- LSP 2300 Latino Communities (also AMST/DSOC 2300)
- LSP 2721 Anthropological Representation: Ethnographies on Latino Culture (also AMST/ANTHR 2721)

- LSP 3180/ Politics of Community Development: Transnational Latinos and the U.S. City (also CRP 3180/5180)
- LSP 3550 Latinos, Law, and Identity (also AMST/DSOC 3550)
- LSP 3750 Comparative U.S. Racial and Ethnic Relations (also AMST/DSOC 3750)
- LSP 3760/ Latino/Latin American Cities (also CRP 3760/6760)
- LSP 3777 The United States (also AMST/ANTHR 3777)
- LSP 3950/ Immigrant Entrepreneurship (also CRP 3111/6111)
- LSP 4032 Immigration and Politics (also AMST/GOVT 4032)
- LSP 4310/ Migrant Workers (also HIST 6310 4310/6310, ILRCB 4020)
- LSP 4510 Multicultural Issues in Education (also AMST/EDUC 4510)
- LSP 6101 Political Identity: Race, Ethnicity, and Nationalism (also GOVT 6101)
- LSP 6424 Ethnoracial Identity in Anthropology, Language, and Law (also ANTHR/AMST 6424, LAW 7231)
- LSP 6460 Latino Language, Ideology, and Practice (also ANTHR 6460)

Electives:

- LSP 1101 Research Strategies in Latino and Africana Studies (also ASRC 1900)
 - LSP 1110 American Diversity: The 20th Century (also AAS/AMST 1110, HIST 1610)
 - LSP 1301 Introduction to World Music I: Africa and the Americas (also MUSIC 1301)
 - LSP 2020 Spanish for English-Spanish Bilinguals (also SPAN 2000)
 - LSP 2410 Immigration and Ethnicity in 20th-Century United States (also AMST/HIST 2400)
 - LSP 3110 Social Movements (also AIS/DSOC 3110)
 - LSP 3191 Racial and Ethnic Politics in the United States (also AMST/GOVT 3191)
 - LSP 3551 Modern and Contemporary Latin American Art (also ARTH 3550, LATA 3680)
 - LSP 4050/6050 U.S.-Cuba Relations (also AMST/HIST/LATA 4050/6050)
 - LSP 4230 Borders (also COML 4230, SPAN 4900)
 - LSP 4850 Immigration: History, Theory, Practice (also AMST/HIST 4850)
 - LSP 4851 Refugees (also HIST/AMST 4851)
 - ART 2170 Art and the Multicultural Experience
- Other elective courses will be determined each semester.

Graduate Minor

The Latino Studies Program at Cornell offers Latino Studies as a minor field in graduate studies. Graduate students select a faculty member from the field of Latino Studies to serve as a minor member on their special committee. Faculty expertise spans multiple

fields, including anthropology, history, literature, law, sociology, government, education, planning, and human development, enabling students to develop programs that meet their specific interests.

Requirements: Students wishing to complete a graduate minor in Latino Studies need to formally register with the Latino Studies Program office, take an upper-level seminar as well as work intensively with a faculty member outside of their major field. Over the course of their study they will be expected to take two other Latino Studies graduate or advanced undergraduate courses outside of their major field. In lieu of available courses, the student and his or her minor field advisor might design a special project that culminates in a paper given at a conference or presented for publication. Each special project will require the approval of the director of graduate studies for the minor field.

www.gradschool.cornell.edu/fields.php?id=MF

Library

The Latino Studies Program library in 432 Rockefeller Hall serves Cornell students, faculty, staff, and the wider local community. The library maintains print and media material pertinent to U.S. Latino issues including a collection of books, research material, archives, and films. The library and conference room also provide meeting space for more than 25 Latino student organizations.

Courses

- LSP 1101 Research Strategies in Latino and Africana Studies (also ASRC 1900)**
Spring (half-semester course; starts 3/9/2010). 1 credit. T. Cosgrave and E. Acree.
The digital revolution has made an enormous amount of information available to research scholars, but discovering resources and using them effectively can be challenging. This course introduces students with research interests in Latino and Africana Studies to search strategies and methods for finding materials in various formats (e.g., digital, film, and print) using information databases such as the library catalog, print and electronic indexes, and the World Wide Web. Instructors provide equal time for lecture and hands-on learning. Topics include government documents, statistics, subject-specific online databases, social sciences, the humanities, and electronic citation management.
- [LSP 1301 Introduction to World Music: Africa and the Americas (also MUSIC 1301) @ (CA-AS)]**
Spring. 3 credits. 1-hour disc. Next offered 2010–2011. S. Pond.
For description, see MUSIC 1301.]
- LSP 2010 Latinos in the United States (also DSOC/SOC 2650)**
Spring. 3 credits; 4-credit option available. H. Velez.
For description, see SOC 2650.
- LSP 2020 Spanish for English-Spanish Bilinguals (also SPAN 2000)**
Spring. 4 credits. D. Cruz de Jesus.
For description, see SPAN 2000.
- LSP 2200 Sociology of Health and Ethnic Minorities (also DSOC 2200)**
Fall. 3 credits. P. Parra.

Discusses the health status of minorities in the United States. Specifically explores intragroup diversity such as migration, economic status, and the influence of culture and the environment on health status and access to health care. Although special attention is given to Latino populations, discussion encompasses other minorities who face similar problems.

[LSP 2250 U.S.-Mexico Border: History, Culture, Representation (also AMST/HIST 2250) (CA-AS)]
Fall. 4 credits. Next offered 2010–2011. M. C. Garcia.]

[LSP 2300 Latino Communities (also AMST/DSOC 2300)]
3 credits. Next offered 2010–2011. R. Mize.
For description, see DSOC 2300.]

LSP 2400 Intro to Latino Literature (also AMST 2401, ENGL 2400) (LA-AS)
Fall. 4 credits. M. P. Brady.
For description, see ENGL 2400.

[LSP 2460 Contemporary Narratives by Latina Writers (also FGSS/SPAN 2460)]
3 credits. Next offered 2010–2011. D. Castillo.]

LSP 2600 Latinos in the United States: Colonial to 1898 (also AMST 2599, HIST 2600) # (HA-AS)
Fall. 4 credits. M. C. Garcia.
For description, see HIST 2600.

[LSP 2610 Latinos in the United States: 1898 to the Present (also AMST/HIST 2610) # (HA-AS)]
Spring. 4 credits. Next offered 2010–2011. M. C. Garcia.
For description, see HIST 2610.]

[LSP 2721 Anthropological Representation: Ethnographies on Latino Culture (also AMST/ANTHR 2721)]
3 credits. Next offered 2010–2011. V. Santiago-Irizarry.]

[LSP 3130 Spanish Writing Workshop for Advanced English-Spanish Bilinguals (also SPAN 3130)]
1 credit. Prerequisite: permission of instructor. Students must be registered concurrently with LSP 2020. Next offered 2010–2011.]

LSP 3180/5180 Politics of Community Development: Transnational Latino and the U.S. City (also CRP 3180/5180)
Spring. 3 credits. A. Sanchez.
For description, see CRP 3180/5180.

[LSP 3191 Racial and Ethnic Politics (also AMST/GOVT 3191)]
4 credits. Next offered 2010–2011. M. Jones-Correa.]

LSP 3550 Latinos, Law, and Identity (also AMST/DSOC 3550)
Fall. 3 credits. R. Mize.
For description, see DSOC 3550.

[LSP 3551 Modern and Contemporary Latino/Latin American Art (also ARTH 3550, LATA 3680)]
4 credits. Next offered 2010–2011. M. Fernandez.
For description, see ARTH 3550.]

LSP 3750 Comparative U.S. Racial and Ethnic Relations (also AMST/DSOC 3750)

Spring, 3 credits. R. Mize.
For description, see DSOC 3750.

LSP 3760/6760 Latin/Latino American Cities (also CRP 3760/6760)

Fall, 3 credits. A. Sanchez.
For description, see CRP 3760/6760.

[LSP 3777 The United States (also AMST/ ANTHR 3777) (CA-AS)]

Fall, 4 credits. Next offered 2011-2012.
V. Santiago-Irizarry.]

LSP 3930 Contemporary Latino Writers (also SPAN 3930) (LA-AS)

Spring, 3 credits. D. Castillo
For description, see SPAN 3930.

LSP 3950/6590 Immigrant Entrepreneurship, Markets, and the Restructured U.S. City: The Latino Case (also CRP 3111/6111)

Spring, 3 credits. A. Sanchez.
For description, see CRP 3850.04/5850.04.

[LSP 3980 Latina/o Popular Culture (also AMST 3981, ENGL 3980) (CA-AS)]

4 credits. Next offered 2011-2012.
M. P. Brady.]

[LSP 4032 Immigration and Politics (also AMST/GOVT 4032) (SBA-AS)]

4 credits. Next offered 2011-2012.
M. Jones-Correa.]

[LSP 4050 U.S.-Cuba Relations (also AMST/HIST/LATA 4050/6050)]

4 credits. Next offered 2010-2011.
M. C. Garcia.]

[LSP 4130 Classics of Latina/o Literature (also SPAN 4130) (LA-AS)]**LSP 4200-4210 Undergraduate Independent Study**

Fall and spring, 2-4 credits. Prerequisite: permission of instructor.
Guided independent study.

LSP 4301 Queering Latinidad (also ENGL/ AMST 4301)

Spring, 4 credits. M. P. Brady.
For description, see AMST 4301

[LSP 4310/6310 Migrant Workers (also HIST 4310/6310, ILRCB 4020) (HA-AS)]

4 credits. Next offered 2010-2011. R. Craib.
Emphasis is on migrant farmworkers in the United States, mostly from the Caribbean and mainland Latin America, with an increasing focus as the semester progresses on farmworkers in central and upstate New York. Course requirements: analytical essays, a final paper, and participation in a service-learning project that are arranged in conjunction with the instructor.]

LSP 4510 Multicultural Issues in Education (also AMST/EDUC 4510)

Fall, 3 credits. S. Villenas.
For description, see EDUC 4510.

LSP 4850 Immigration: History, Theory, and Practice (also AMST/HIST 4850) (HA-AS)

Fall, 4 credits. Prerequisite: permission of instructor. M. C. Garcia.
For description, see HIST 4850.

LSP 4851 Refugees (also HIST/AMST 4851) (HA-AS)

Spring, 4 credits. M. C. Garcia.
For description, see HIST 4851.

LSP 6200-6210 Graduate Independent Study

Fall, spring, 2-4 credits. Prerequisite: permission of instructor.
Guided independent study.

[LSP 6424 Ethnoracial Identity in Anthropology, Language, and Law (also ANTHR 6424, LAW 7231)]

4 credits. Next offered 2010-2011.
V. Santiago-Irizarry.]

LAW AND SOCIETY

Co-directors: M. Lynch (science and technology studies), 302 Rockefeller Hall, 255-7294, mel27@cornell.edu, and R. Lieberwitz (ILR), 287A Ives Hall, 255-3289, rl15@cornell.edu

Advisers: G. Alexander (law), E. Anker (English), D. Dunning (psychology), M. Evangelista (government), C. Grumbach (Ethics & Public Life Program), G. Hay (law), S. Hilgartner (science and technology studies), P. Hyams (history), M. Karns ILR), M. Katzenstein (government), R. Miller (philosophy), M. B. Norton (history), D. Powers (Near East studies), A. Riles (law), V. Santiago-Irizarry (anthropology)

The Law and Society minor provides an opportunity for focused study of the interaction between law and society from an interdisciplinary perspective predominantly rooted in the social sciences and humanities: anthropology, comparative literature, economics, government, history, philosophy, psychology, science and technology studies, and sociology.

The Law and Society minor is open to all undergraduates. Though many of those who register for the minor have intentions of going on to law school or a law-related profession, Law and Society is not designed as a minor only for students interested in entering law school. The best candidates for the Law and Society minor are students interested in broader relations between legal institutions and historical and contemporary societies. This broader topic is, and should be, of interest to many students, regardless of whether they intend to enter the legal profession. A large selection of courses and on-campus events is available for completing the minor. The benefits of a student's participation depend on the particular courses and events selected, and the effort and interest invested.

Registration

To allow sufficient time for a coherent program of study to be developed and completed, students who have an interest in the law and society minor are required to register before the start of the second semester of their junior year. Under extenuating circumstances, late registrations may be accepted at the discretion of the directors, but only if the registrant has a plan already formulated for completing the minor's requirements. Late registrants can use the standard online registration form but should also submit the online completion plan at the time of registration. Information about, and forms required for, the law and society minor can be found at www.arts.cornell.edu/epl/lawsociety.htm. As part of the registration process, each student is assigned a law and society adviser who is available to provide

guidance with course selection and help with other questions or concerns related to the student's participation in the minor. The name and contact information of the assigned adviser are included in a welcome e-mail that is sent shortly after a student's registration form is received.

Four-Event Requirement

Many students find access to and participation in law and society events a particularly beneficial component of the minor. Officially registered law and society students are notified of qualifying events (usually at least 10 per semester) and other information related to the concentration through an e-mail listserv and postings outside the Ethics and Public Life office. Between registration and graduation, students must attend a minimum of four events (signature on official sign-in sheets is the required proof of attendance for credit); students seeking a broader perspective are encouraged to attend as many events as they can.

Four-Course Requirement

Law and society is an interdisciplinary minor requiring students to successfully complete four courses (at least 12 credits) from the approved course list, earning a letter grade no lower than C+ in each (C- for appropriate courses completed before the spring 2008 semester). Students registering for law and society after the conclusion of the spring 2008 semester will be required to select one course each from four (out of five) different categories of study. At least two courses must fall outside the student's major, and no more than two courses can be in the same subject area, the only exception being cross-listed courses, which may be counted in any of the departments listed. Appropriate courses taken before registering for the law and society minor can be counted toward the four-course requirement. There are no required courses, but past students have found GOVT 3131 and PSYCH 2650 particularly relevant. For the most current list of approved courses, please consult the Law and Society web page or contact the EPL office.

At the discretion of the law and society directors, permission may be granted to substitute an appropriate course that has been:

1. accepted from another educational institution toward the student's degree program (one course maximum)
2. taken as part of a semester abroad program and approved by Cornell for course credit
3. recently added to the Cornell curriculum

The best evidence of a course's appropriateness is the syllabus, which is often available online and can be submitted electronically to /epl@cornell.edu for a determination. Petitions for course substitutions should be submitted before the student's final semester and include identification of a course already approved that is closest in content to the course being petitioned for approval.

Progress Toward Completion

To facilitate tracking of courses taken and events attended, a printable student progress record is available on the Law and Society

web page. By the end of the student's next-to-last semester before graduation, the course and event information from the student progress record is to be submitted electronically using the online Completion Plan.

The law and society minor is administered by the Ethics and Public Life (EPL) office. For more information, consult www.arts.cornell.edu/epl/lawsociety.htm or contact the EPL administrative assistant at 240 Goldwin Smith Hall, ep@cornell.edu, 255-8515.

LESBIAN, GAY, BISEXUAL & TRANSGENDER STUDIES

S. Bem, B. Correll, I. DeVault, J. Frank, J. E. Gainer, S. Haenni, E. Hanson, C. Howie, I. V. Hull, P. Hyams, M. Katzenstein, P. Liu, T. Loos, K. March, C. A. Martin, K. McCullough, T. Murray, M. B. Norton, J. Peraino, M. Raskolnikov, N. Salvato, R. Savin-Williams, A. M. Smith, A. Villarejo, S. Warner, R. Weil

The field of Lesbian, Gay, Bisexual & Transgender Studies is devoted to the interdisciplinary study of the social construction of sexuality. LGBT Studies is founded on the premise that the social organization of sexuality is best studied from the perspectives offered by those positions that have been excluded from established cultural norms.

In addition to offering a graduate minor, the field of LGBT Studies offers an undergraduate minor, which is administered under the auspices of Feminist, Gender, & Sexuality Studies (FGSS) and which consists of four courses from the list below. Although most of the courses in LGBT Studies (including those on men) generally fall under the aegis of FGSS and are hence crosslisted with it, not all of the courses in FGSS are sufficiently focused enough on the social construction of sexuality per se to be part of the LGBT Studies minor. In order to qualify for the minor, courses must devote a significant portion of their time to sexuality and to questioning the cultural and historical institution of exclusive heterosexuality. Students selecting their four courses from the LGBT Studies subset must identify their minor as either LGBT Studies or FGSS; they cannot double-count their credits and thereby use the same courses for both minors.

Students interested in the LGBT Studies minor should contact the Lesbian, Gay, Bisexual, & Transgender Studies Office in 391 Uris Hall.

Courses

ANTHR 2400 Cultural Diversity and Contemporary Issues

Fall. 3 credits. Staff.
For description, see ANTHR 2400.

ANTHR 3421/6421 Sex and Gender in Cross-Cultural Perspective (also FGSS 3210/6210)

Fall. 4 credits. K. March.
For description, see ANTHR 3421.

[ENGL 2760 Desire (also COML/FGSS 2760, THETR 2780)

Spring. 4 credits. Letter grades only. Next offered 2011–2012. E. Hanson.]

ENGL 3550 Decadence (also COML/FGSS 3550)

Spring. 4 credits. E. Hanson.
For description, see ENGL 3550.

[ENGL 4780 Intersections in Lesbian Fiction (also AMST 4780, FGSS 4770)

4 credits. Next offered 2011–2012.
K. McCullough.]

[ENGL 6030 The Question of Feminist and Queer Criticism in Premodern Studies (also FGSS 6030)

Spring. 4 credits. Next offered 2010–2011.
M. Raskolnikov.]

[ENGL 6550 Modernist Fiction and the Erotics of Style (also FGSS 6550)

Spring. 4 credits. E. Hanson.]

FGSS 2010 Introduction to Feminist, Gender, and Sexuality Studies

Fall and spring. 4 credits. J. Juffer and S. Martin.
For description, see FGSS 2010.

[FGSS 3702 Desire and Cinema (also COML/ENGL 3702)

Spring. 4 credits. Next offered 2011–2012.
E. Hanson.]

FGSS 4000 Senior Seminar in Feminist, Gender, and Sexuality Studies

Fall. 4 credits. S. Martin.
For description, see FGSS 4000.

[FGSS 4791 Transgender and Transexuality (also ENGL 4791)

Fall. 4 credits. Next offered 2011–2012.
M. Raskolnikov.]

[GOVT 4625 Sexuality and the Law (also AMST 4265, FGSS 4610)

Spring. 4 credits. Next offered 2011–2012.
A. M. Smith.]

[GOVT 7625 Sexuality and the Law (also FGSS 7620)

Spring. 4 credits. Next offered 2009–2010.
A. M. Smith.]

HD 3840 Gender and Sexual Minorities (also FGSS 3850)

Fall. 3 credits. K. Cohen.
For description, see HD 3840.

[HIST 2090 Seminar in Early America (also AMST/FGSS 2090)

Fall. 4 credits. Next offered 2010–2011.
M. B. Norton.]

[HIST 2730 Women in American Society, Past and Present (also FGSS 2730)

Fall. 4 credits. Next offered 2010–2011.
M. B. Norton.]

[HIST 3680 Marriage and Sexuality in Medieval Europe (also FGSS/RELST 3680)

4 credits. Next offered 2010–2011.
P. Hyams.]

[HIST 4160 Gender and Sex in Southeast Asia (also ASIAN 4416, FGSS 4160)

Fall. 4 credits. Next offered 2011–2012.
T. Loos.]

[THETR 4200/6200 Parody (also FGSS 4270/6370)

Spring. 4 credits. Next offered 2010–2011.
N. Salvato.]

[THETR 6050 Camp, Kitsch, and Trash (also FGSS 6050)

Fall. 4 credits. Next offered 2010–2011.
N. Salvato.]

[THETR 6060 Passionate Politics: Affect, Protest, Performance (also FGSS 6040)

Spring. 4 credits. Next offered 2010–2011.
S. Warner.]

LINGUISTICS

ling.cornell.edu

J. Whitman, chair (209 Morrill Hall); M. Weiss, director of graduate studies (218 Morrill Hall); W. Harbert, director of undergraduate studies (210 Morrill Hall); D. Abusch, J. Bowers, W. Browne, A. Cohn, M. Diesing, J. Hale, S. Hertz, A. Nussbaum, M. Rooth, C. Rosen, M. Wagner, D. Zec. Visiting: S. Khan.

Linguistics, the systematic study of human language, lies at the crossroads of the humanities and the social sciences, and much of its appeal derives from the special combination of intuition and rigor that the analysis of language demands. The interests of the members of the Department of Linguistics and linguistic colleagues in other departments span most of the major subfields of linguistics: phonetics and phonology, the study of speech sounds; syntax, the study of how words are combined; semantics, the study of meaning; historical linguistics, the study of language change over time; and sociolinguistics, the study of language's role in social and cultural interactions.

Studying linguistics is not a matter of studying many languages. Linguistics is a theoretical discipline with ties to such areas as cognitive psychology, philosophy, logic, computer science, and anthropology. Nonetheless, knowing particular languages (e.g., Spanish or Japanese) in some depth can enhance understanding of the general properties of human language. Not surprisingly, then, many students of linguistics owe their initial interest to a period of exposure to a foreign language, and those who come to linguistics by some other route find their knowledge about languages enriched and are often stimulated to embark on further foreign language study.

Students interested in learning more about linguistics and its relationship to other disciplines in the humanities and social sciences are encouraged to take LING 1101, a general overview, which is a prerequisite for most other courses in the field, or one of the first-year writing seminars offered in linguistics (on topics such as metaphor and the science of language). LING 1101 and other introductory courses fulfill the social science distribution requirement. Most 1100- and 2200-level courses have no prerequisites and cover various topics in linguistics (e.g., LING 1170 Introduction to Cognitive Science; LING 2285 Linguistic Theory and Poetic Structure) or focus on the linguistics of a particular geographic region or historical development of particular languages (e.g., LING 2217 History of the English Language to 1300; LING 2241 Yiddish Linguistics). Some of these courses also fulfill the breadth requirements.

Talks and discussions about linguistics are offered through the Undergraduate Linguistics Forum and the Linguistics Colloquium (sponsored by the department and the Cornell Linguistic Circle). These meetings are open to the university public and anyone wishing to learn more about linguistics is most welcome to attend.

The Major

For questions regarding the linguistics major, contact Professor Wayne Harbert (210 Morrill Hall, 255-8441, weh2@cornell.edu).

The prerequisite for a major in linguistics is the completion of LING 1101 and either LING 3301, 3302, 3303, or 3304. The major has its own language requirement, different from that of the College of Arts and Sciences, which should be completed as early as possible: majors must complete the equivalent of two semesters of college-level study of a language that is either non-European or non-Indo-European (language study undertaken to satisfy the college requirement can also count toward the major requirement if the language meets these conditions). With approval of the department's director of undergraduate studies, this requirement may be waived for students taking the cognitive studies concentration or a double major. The minimum acceptable grade in courses counted toward the major is C.

The other standard requirements for the linguistics major are as follows:

1. LING 3301 Introduction to Phonetics, LING 3302 Introduction to Phonology, LING 3303 Introduction to Syntax, and LING 3304 Introduction to Semantics and Pragmatics (one of which will already have been taken as a prerequisite to the major).
2. LING 3314 Historical Linguistics.
3. Three additional courses in linguistics at the 3300 or 4400 level, of which two must be general linguistics.
4. A course at or beyond the 3300 level in the structure of a language, or LING 3300 Field Methods for Undergraduates or LING 4400 Language Typology.

Some substitutions to these standard requirements are possible after consultation with your advisor and approval by the DUS.

Honors

Applications for honors should be made during the junior year or by the start of fall semester of the senior year. For further information, please contact the DUS. Candidates for admission must have a 3.0 (B) average overall and should have a 3.5 average in linguistics courses. In addition to the regular requirements of the major, the candidate for honors will complete an honors thesis and take a final oral exam in defense of it. The thesis is usually written during the senior year but may be started in the second semester of the junior year when the student's program so warrants. The oral exam will be conducted by the honors committee, consisting of the thesis advisor and at least one other faculty member in linguistics. Members of other departments may serve as additional members if the topic makes this advisable. LING 4493 and 4494 may be taken in conjunction with thesis research and writing but are not required.

First-Year Writing Seminars

For descriptions, consult the John S. Knight brochure for times, instructors, and descriptions.

Courses

LING 1101 Introduction to Linguistics (KCM-AS)

Fall or spring. 4 credits each semester. Fall, R. Katzir; spring, J. Hale.

Overview of the science of language, especially its theoretical underpinnings, methods, and major findings. Areas covered include: the relation between sound and meaning in human languages, social variation in language, language change over time, universals of language, and the mental representation of linguistic knowledge. Students are introduced to a wide variety of language phenomena, drawn not only from languages resembling English, but also from many that appear to be quite unlike English, such as those native to the Americas, Africa, Asia, Australia, and the South Pacific.

LING 1109 English Words: Histories and Mysteries (also CLASS 1699) # (HA-AS)

Spring. 3 credits. W. Harbert.

Where do the words we use come from? This course examines the history and structure of the English vocabulary from its distant Indo-European roots to the latest in technical jargon and slang. Topics include formal and semantic change, taboo and euphemism, borrowing, new words from old, "learned" English loans from Greek and Latin, slang, and society.

LING 1111 American Sign Language I

Summer only. 4 credits. T. Galloway.

Students with no previous background in American Sign Language (ASL) are introduced to the nature of a signed language and develop expressive and receptive skills in ASL. Basic grammar and vocabulary are covered, including explanations of the fundamental parts of a sign, proper use of fingerspelling, and the significance of nonmanual features. Instruction is supplemented with videotexts allowing students to begin to explore the visual literature of the Deaf community in the United States—stories, poems, and jokes that are unique to Deaf culture. Readings and class discussions acquaint students with the causes of deafness, the historical development of ASL and its linguistic status, and characteristics of deaf education both throughout history and in the present day.

LING 1112 American Sign Language II

Summer only. 4 credits. Prerequisite: LING 1111 or permission of instructor. T. Galloway.

In this intermediate course, students continue to develop expressive and receptive fluency in ASL. Focus is on greater descriptive skill, developing intermediate-level narratives, and enhancing conversational ability. Advanced grammar and vocabulary is supplemented with further instruction in the linguistic structure of ASL. Readings, class discussions, and videotexts containing samples of the visual literature of the U.S. Deaf community continues students' investigation into American Deaf history and the shaping of modern Deaf culture.

LING 1131-1132 Elementary Sanskrit (also CLASS 1331-1332, SANSK 1131-1132)

1131, fall; 1132, spring. 4 credits each semester. Fall, A. Nussbaum; spring, A. Ruppel.

For description, see SANSK 1131-1132.

LING 1170 Introduction to Cognitive Science (also COGST 1101, CS 1710, PHIL 1910, PSYCH 1102) (KCM-AS)

Fall, summer. 3 credits. Staff. For description, see COGST 1101.

LING 2215 Psychology of Language (also COGST/PSYCH 2150) (KCM-AS)

Spring. 3 credits. M. Christiansen. For description, see PSYCH 2150.

LING 2217 History of the English Language to 1300 (also ENGL 2170) # (HA-AS)

Fall. 4 credits. W. Harbert. Explores the development of the English language from its Indo-European beginnings through the period of Early Middle English. Topics include linguistic reconstruction, changes in sound, vocabulary and grammatical structure, external influences, and Old and Early Middle English language and literature. This course forms a sequence with LING 2218, but the two may be taken independently.

LING 2218 History of the English Language since 1300 (also ENGL 2180) (HA-AS)

Spring. 4 credits. W. Harbert. Traces English from Chaucer to the present, including the development of standard English and dialects, and the rise of English as a world language.

LING 2236 Introduction to Gaelic

Spring. 3 credits. W. Harbert. Introduction to the Scottish Gaelic language, with some discussion of its history, structure, and current status.

[LING 2238 Introduction to Welsh

Fall. 3 credits. Next offered 2010-2011. W. Harbert. Introduction to the Welsh language, with discussion of its history, structure, and current status, and a brief introduction to Welsh literature.]

[LING 2241 Yiddish Linguistics (also JWST 2271) (SBA-AS)

Spring. 3 credits. No previous knowledge of Yiddish required. Next offered 2010-2011. M. Diesing. Yiddish language and linguistics, including aspects of its morphology, syntax, and phonology. Also the history of the Yiddish language, and sociolinguistic topics such as Yiddish as a minority language, and the influence of Yiddish on American English.]

[LING 2244 Language and Gender (also FGSS 2440) (SBA-AS)

Spring. 4 credits. For nonmajors or majors. Next offered 2010-2011. S. McConnell-Ginet. Explores connections between language (use) and gender/sex systems. Readings draw from work in linguistics, anthropology, philosophy, psychology, literature, and women's studies and feminist theory.]

[LING 2246/5546 Minority Languages and Linguistics (SBA-AS)

Fall. 4 credits. Graduate students register under LING 5546. Next offered 2011-2012. W. Harbert. Examines minority languages from linguistic, social, and political perspectives, including such issues as language death, language maintenance, bilingualism, language policy, and language rights.]

LING 2251-2252 Intermediate Sanskrit (also CLASS 2351-2352, SANSK 2251-2252) @ #

2251, fall; 2252, spring. 3 credits each semester. *Satisfies Option 1.* Fall: L. McCrea; spring: A. Ruppel. For description, see SANSK 2251-2252.

[LING 2261/6661 Introduction to Indo-European Linguistics (HA-AS)]

Fall. 4 credits. Graduate students register under LING 6661. Next offered 2010-2011. M. Weiss.

An introduction to the phonology, morphology, and syntax of Proto-Indo-European and the chief historical developments of the daughter languages.]

LING 2285/5585 Linguistic Theory and Poetic Structure (also ENGL 2960/5850) (LA-AS)

Spring. 4 credits. Graduate students register under LING 5585. J. Bowers. The aim of this course is to show how certain results of modern linguistics can usefully be applied to the analysis and interpretation of poetry.

[LING 3300 Field Methods for Undergraduates (KCM-AS)]

Spring. 4 credits. Prerequisite: students should normally have completed (or be concurrently enrolled in) LING 3301, 3302, 3303, 3304. Next offered 2010-2011. W. Harbert.

A hands-on course in which students gain experience in eliciting linguistic data from a native speaker of an unfamiliar language, organizing and analyzing those data and producing descriptions of the lexicon, phonetics, phonology, morphology, syntax, and texts in the language on the basis of them.]

LING 3301 Introduction to Phonetics (KCM-AS)

Fall. 4 credits. Prerequisite: LING 1101 or permission of instructor. S. Khan. Introduction to the study of the physical properties of human speech sounds, including production, acoustics, and perception of speech. Provides in-depth exposure to the breadth of sounds found across human languages. Students achieve a high level of skill in phonetic transcription and some practice in reading spectrograms. An introduction to speech synthesis and automatic speech recognition is also provided. A small course project to discover the phonemes of an unknown language is undertaken.

LING 3302 Introduction to Phonology (KCM-AS)

Spring. 4 credits. Prerequisite: LING 1101 or permission of instructor. A. Cohn. Introduction to phonology, which studies the patterning of speech sounds in human language. Emphasis is on formal devices, such as rules and representations, that capture the internal organization of speech sounds as well as their grouping into larger units, syllables, and feet.

LING 3303 Introduction to Syntax (KCM-AS)

Fall. 4 credits. Prerequisite: LING 1101 or permission of instructor. J. Bowers. Introduction to syntax, which studies how words are combined to form phrases and sentences. The course aims to give students the ability to address questions regarding the syntactic properties that are shared by natural languages (as well as those that distinguish

them) in a precise and informed way. Topics include those that lie at the heart of theoretical syntax: phrase structure, transformations, grammatical relations, and anaphora. Emphasis throughout the course is placed on forming and testing hypotheses.

LING 3304 Introduction to Semantics and Pragmatics (KCM-AS)

Spring. 4 credits. Prerequisite: LING 3303 or permission of instructor. M. Diesing. Examines the two major components of sentence meaning: (1) how sentences mean what they mean and (2) how they can be used to communicate more than what they (literally) mean. Investigates precise ways of describing the possible interpretations of a sentence and the relationship between meaning and syntactic structure. Topics include the representation of lexical meaning, the meaning of quantifier phrases and analyses of scope ambiguities, and classic puzzles of reference. Also examines possible applications of the theory to linguistically interesting legal cases (torts and criminal law), slips of the tongue, acquisition studies, language disorders, and connections with the philosophy of language.

LING 3308 Readings in Celtic Languages

Fall or spring, depending on demand. 1 credit. Prerequisite: permission of instructor. S-U grades only. W. Harbert. Reading/discussion groups in Welsh or Scottish Gaelic.

LING 3314 Introduction to Historical Linguistics # (HA-AS)

Spring. 4 credits. Prerequisite: LING 3301 or permission of instructor. M. Weiss. Survey of the basic mechanisms of linguistic change, with examples from a variety of languages.

LING 3315-3316 Old Norse

3315, fall; 3316, spring. 4 credits each semester. L. Heimsdóttir. Old Norse is a collective term for the earliest North Germanic literary languages: Old Icelandic, Old Norwegian, Old Danish, and Old Swedish. The richly documented Old Icelandic is the center of attention, and the purpose is twofold: the students gain knowledge of an ancient North Germanic language, important from a linguistic point of view, and gain access to the medieval Icelandic (and Scandinavian) literature. 3315: The structure of Old Norse (Old Icelandic), phonology, and morphology, with reading of selections from the Prose-Edda, a 13th-century narrative based on the Eddaic poetry. 3316: Extensive reading of Old Norse texts, among them selections from some of the major Icelandic family sagas: Njals saga, Grettis saga, and Egils saga, as well as the whole Hrafnkels saga.

LING 3321-[3322] History of the Romance Languages (also ROMS 3210-3220) # (HA-AS)

3321, spring; [3322], 4 credits each semester. Prerequisites: for LING 3321, LING 1101, or equivalent and qualification in any Romance language; for LING 3322, LING 3321, or permission of instructor. C. Rosen.

3321 covers popular Latin speech, early documentary sources, Pan-Romance phonological changes, regional divergence, early external history, and non-Latin influences. [3322 covers the shaping of Romance morphological systems, changes in the lexicon, medieval diglossia, and the

emergence of Romance standards. 3321 and 3322 both include selected readings in the earliest Romance texts.]

LING 3333 Problems in Semantics (also COGST 3330, PHIL 3700) (KCM-AS)

Fall. 4 credits. Prerequisite: logic or semantics course or permission of instructor. D. Abusch. Looks at problems in the semantic analysis of natural languages, critically examining work in linguistics and philosophy on particular topics of current interest.

[LING 3347 Topics in the History of English (HA-AS)]

Fall. 4 credits. Prerequisite: LING 2217, 3314, course in Old or Middle English, or permission of instructor. Next offered 2010-2011. W. Harbert. Treats specific topics in the linguistic history of the English language, selected on the basis of the particular interests of the students and the instructor.]

LING 3390 Independent Study in Linguistics

Fall or spring. 1-4 credits, variable. Prerequisite: LING 1101 and permission of instructor. Staff. Independent study of linguistics topics not covered in regular curriculum for undergrads.

[LING 4310 Topics in Cognitive Studies (also COGST/BIONB/PSYCH 4310)]

Fall. 4 credits. Next offered 2010-2011. S. Edelman. For description, see COGST 4310.]

[LING 4400 Language Typology (KCM-AS)]

Spring. 4 credits. Prerequisite: LING 1101. Next offered 2010-2011. J. Whitman. Studies a basic question of contemporary linguistics: in what ways do languages differ, and in what ways are they all alike? Efforts are made to formalize universals of syntax and to characterize the total repertory of constructions available to natural languages. Common morphological devices and their syntactic correlates are covered. Emphasis is on systems of case, agreement, and voice.]

LING 4401-4402 Phonology I, II (KCM-AS)

4401, fall; 4402, spring. 4 credits each semester. Prerequisites: for LING 4401, LING 3302 or equivalent; for LING 4402, LING 4401 or permission of instructor. Fall, D. Zec; spring, A. Cohn. 4401 provides a basic introduction to phonological theory. The first half of the course focuses on basic principles of phonology, patterns of sounds, and their representations. In the second half, the nature of syllable structure and feature representations are explored. 4402 provides further refinement of the issues investigated in 4401, focusing in particular on metrical theory, lexical phonology, autosegmental phonology, and prosodic morphology.

LING 4403-4404 Syntax I, II (KCM-AS)

4403, fall; 4404, spring. 4 credits each semester. Prerequisites: for LING 4403, LING 3303; for LING 4404, LING 4403 or permission of instructor. Fall, R. Katzir; spring, M. Diesing. 4403 is an advanced introduction to syntactic theory within the principles and parameters/minimalist frameworks. Topics include phrase structure, argument structure (unaccusative verbs, unergative verbs, double object constructions), principles of word order, and

the binding theory. 4404 is a continuation of 4403, focusing on syntactic dependencies, including the theory of control, an examination of locality constraints on movement, covert versus overt movement, and the syntax of quantification. The purpose of the course is to develop the background needed for independent syntactic research.

[LING 4405 Sociolinguistics (CA-AS)]

Fall. 4 credits. Prerequisite: LING 1101 or another linguistics course or permission of instructor. Next offered 2010–2011. Staff. This course surveys some of the different issues, theories, concepts, and methods in sociolinguistics, the study of the interaction of language with society.]

[LING 4409 Structure of Italian (KCM-AS)]

Spring. 4 credits. Prerequisites: LING 1101 and qualification in any Romance language. Next offered 2010–2011. C. Rosen.]

[LING 4411 History of the Japanese Language (also ASIAN 4411, JAPAN 4410) @ # (HA-AS)]

Fall. 4 credits. Prerequisite: reading knowledge of Japanese. J. Whitman. Overview of the history of the Japanese language followed by intensive examination of issues of interest to the participants. Students should have a reading knowledge of Japanese.

[LING 4412 Linguistic Structure of Japanese (also ASIAN 4412) (KCM-AS)]

Spring. 4 credits. Prerequisites: JAPAN 1102 or permission of instructor and LING 1101. Next offered 2010–2011. J. Whitman.

Introduction to the linguistic study of Japanese, with an emphasis on morphology and syntax.]

[LING 4417 History of the Russian Language (also RUSSA 4401) (HA-AS)]

Spring. 4 credits. Prerequisite: permission of instructor. W. Browne. Phonological, morphological, and syntactic developments from Old Russian to modern Russian.

[LING 4419 Phonetics I (KCM-AS)]

Fall. 4 credits. Prerequisite: LING 3301 or permission of instructor. S. Khan. Provides a basic introduction to the study of phonetics. Topics include anatomy and physiology of the speech production apparatus, transcription and production of some of the world's sounds, basic acoustics, computerized methods of speech analysis, acoustic characteristics of sounds, speech perception, speech synthesis, and stress and intonation.

[LING 4420 Phonetics II (KCM-AS)]

Spring. 4 credits. Prerequisite: LING 4419. Next offered 2010–2011. Staff. Continuation of Phonetics I, providing a more detailed survey of some areas in acoustic and articulatory phonetics. Topics include feature theory, vocal tract acoustics, quantal theory, speaker normalization, theories of speech perception, coarticulation, theories of speech production, and prosody. In addition, a number of "hands-on" projects are part of the course.]

[LING 4421 Semantics I (KCM-AS)]

Fall. 4 credits. Prerequisite: LING 3304. D. Abusch. Introduces methods for theorizing about meaning within generative grammar. These techniques allow the creation of grammars that

pair syntactic structures with meanings. Students look at several empirical areas in detail, among them complementation (combining heads with their arguments), modification, conjunction, definite descriptions, relative clauses, traces, bound pronouns, and quantification. An introduction to logical and mathematical concepts used in linguistic semantics (e.g., set theory, functions and their types, and the lambda notation for naming linguistic meanings) is included in the course.

[LING 4422 Semantics II (KCM-AS)]

Spring 4 credits. Prerequisite: LING 4421 or permission of instructor. R. Katzir. Uses the techniques introduced in Semantics I to analyze linguistic phenomena, including quantifier scope, ellipsis, and referential pronouns. Temporal and possible worlds semantics are introduced and used in the analysis of modality, tense, and belief sentences. The phenomena of presupposition, indefinite descriptions, and anaphora are analyzed in a dynamic compositional framework that formalizes the idea that sentence meaning effects a change in an information state.

[LING 4423 Morphology (KCM-AS)]

Fall. 4 credits. Prerequisite: LING 1101 or permission of instructor. M. Diesing. Addresses the basic issues in the study of words and their structures. Provides an introduction to different types of morphological structures with examples from a wide range of languages. Special emphasis is given to current theoretical approaches to morphological theory and to computational models of morphology.

[LING 4424 Computational Linguistics (also COGST 4240, CS 3740) (MQR)]

Fall. 4 credits. Recommended: previous course work in linguistics or programming. J. Hale.

Introduces methods for doing a language computationally, including parsing and representation of syntactic analyses; computational morphology; probabilistic grammars; feature constraint formalisms for syntax; treebank methodology.

[LING 4425 Pragmatics (also PHIL 4720) (KCM-AS)]

Fall. 4 credits. Prerequisite: LING 3304 or PHIL 2310, or permission of instructor. Next offered 2010–2011. D. Abusch.

Introduction to aspects of linguistic meaning that have to do with context and with the use of language. Topics include context change semantics and pragmatics, presupposition and accommodation, conversational implicature, speech acts, and the pragmatics of definite descriptions and quantifiers.]

[LING 4427 Structure of Hungarian (also HUNGR 4427) (KCM-AS)]

Fall. 4 credits. Prerequisite: LING 1101. Next offered 2010–2011. W. Browne.]

[LING 4428/6628 Connectionist Psycholinguistics (also COGST 4280, PSYCH 4280/6280)]

Fall. 3 credits. Next offered 2010–2011. M. Christiansen.

For description, see PSYCH 4280.]

[LING 4430 Structure of Korean (also ASIAN/KOREA 4430) (KCM-AS)]

Spring. 4 credits. Prerequisite: KOREA 1102 or linguistics course. No previous knowledge of Korean required. Next offered 2010–2011. J. Whitman.

Intensive examination of the syntax and phonology of a non-Indo-European language with the objective of testing principles of current linguistic theory.]

[LING 4432 Middle Korean (also KRLIT 4432) @ # (LA-AS)]

Spring. 4 credits. Offered alternate years. Prerequisite: KOREA 2202 or equivalent. Next offered 2011–2012. J. Whitman. Introduction to the premodern Korean language. Focuses on the earliest *hangeul* texts of the 15th century, but also introduces materials written in Korean using Chinese characters before the 15th century, including *hyangga*. No previous background in linguistics is required, but students should have a command of written Korean of at least the third-year level.]

[LING 4433 The Lesser-Known Romance Languages (also ROMS 4330) (KCM-AS)]

Spring. 4 credits. Prerequisites: LING 1101 and qualification in any Romance language. Next offered 2010–2011. C. Rosen. Surveys several Romance languages/dialects, examining sound systems, grammars, and historical evolution from Latin. Readings represent both the modern languages and their earliest attested stages.]

[LING 4436 Language Development (also COGST/HD/PSYCH 4360) (KCM-AS)]

Fall. 4 credits. Next offered 2010–2011. B. Lust.

For description, see COGST 3370.]

[LING 4441 Introduction to Germanic Linguistics (also GERST 4410) (HA-AS)]

Spring. 4 credits. Prerequisite: LING 1101 or permission of instructor. Next offered 2011–2012. W. Harbert. Survey of major issues in historical Germanic linguistics.]

[LING 4443 Linguistic Structure of Russian (also RUSSA 4403) (KCM-AS)]

Fall. 4 credits. Prerequisites: reading knowledge of Russian. Next offered 2010–2011. W. Browne.

A synchronic analysis of the structure of modern Russian. This course deals primarily with phonology and its relation to morphology.]

[LING 4450 Lab Course: Language Development (also COGST 4500, HD/PSYCH 4370)]

Fall. 2 credits. Next offered 2010–2011. B. Lust.

For description, see COGST 4500.]

[LING 4451 Greek Comparative Grammar (also GREEK 4411) (KCM-AS)]

Fall. 4 credits. Next offered 2010–2011. A. Nussbaum.

For description, see GREEK 4411.]

[LING 4452 Latin Comparative Grammar (also LATIN 4452) (KCM-AS)]

Fall. 4 credits. Next offered 2010–2011. A. Nussbaum.

For description, see LATIN 4452.]

[LING 4453 Structure of Latin (also LATIN/ROMS 4453) # (KCM-AS)]

Fall. 4 credits. Prerequisite: a basic knowledge of Latin forms and constructions or some previous work in Romance and/or general linguistics. Next offered 2010–2011. A. Nussbaum.

An analysis of the phonology, morphology, and syntax of Latin from a synchronic point of view. The course is intended for a twofold audience—students of Latin interested in a linguist's-eye view of the facts and students of general and/or Romance linguistics interested in what Latin data might have to offer for historical and general linguistic purposes.]

LING 4455 Greek Dialects (also GREEK 4455) (KCM-AS)

Fall. 4 credits. A. Nussbaum.
For description, see GREEK 4455.

LING 4456 Archaic Latin (also LATIN 4456) (LA-AS)

Spring. 4 credits. M. Weiss.
For description, see LATIN 4456.

[LING 4457 Homeric Philology (also GREEK 4457) # (LA-AS)]

Spring. 4 credits. Next offered 2011–2012.
A. Nussbaum.
For description, see GREEK 4457.]

[LING 4459 Mycenaean Greek (also GREEK 4459) (LA-AS)]

Spring. 4 credits. Next offered 2011–2012.
A. Nussbaum.
For description, see GREEK 4459.]

[LING 4460 Sanskrit Comparative Grammar (also CLASS 4490) (KCM-AS)]

Fall. 4 credits. Prerequisite: reasonable familiarity with classical Sanskrit morphology. Next offered 2010–2011.
A. Nussbaum.

Survey of the historical phonology and morphology of Sanskrit in relation to the Indo-Iranian and Indo-European comparative evidence.]

LING 4474 Introduction to Natural Language Processing (also COGST/CS 4740)

Spring. 4 credits. C. Cardie.
For description, see CS 4740.

LING 4476 Statistics for Linguists

Spring. 4 credits. J. Hale.
Introduces distributions, sampling, and hypothesis testing as tools for linguistic research. Students learn to use appropriate software, and as time permits, craft predictive theories using probabilistic grammars and linear models. Only high math presupposed.

LING 4485 Topics in Computational Linguistics (MQR)

Fall. 4 credits. M. Rooth and D. Zec.
Computational modeling of phonology. Emphasizes finite state formalisms that make it possible to explicitly construct optimality theoretic phonology, including constructs such as harmony orders and constraint families, and to compute with large or even infinite candidate sets. Accessible both to students with background in phonology and those with computational preparation.

LING 4493 Honors Thesis Research

Fall. 4 credits. Staff.
May be taken before or after LING 4494, or may be taken independently.

LING 4494 Honors Thesis Research

Spring. 4 credits. Staff.
May be taken as a continuation of, or before, LING 4493.

LING 6600 Field Methods

Spring. 4 credits. Prerequisites: LING 4401, 3301, or 3302 and 4403 or 3303, or permission of instructor. J. Whitman.
Elicitation, recording, and analysis of data from a native speaker of a non-Western language not generally known to students.

[LING 6601 Topics in Phonological Theory]

Spring. 4 credits, variable. Prerequisites: LING 4401 and one higher-level phonology course. Next offered 2010–2011. Staff.
Selected topics in current phonological theory.]

LING 6602 Topics in Morphology

Spring. 4 credits. Prerequisites: LING 4401 or 4403 or permission of instructor. J. Bowers.
Selected topics in current morphological theory.

LING 6604 Research Workshop

Fall. 2 credits. Requirement for third-year linguistics graduate students. S–U grades only. W. Harbert.
Provides a forum for presentation and discussion of ongoing research, and development of professional skills. Participants must enroll in a concurrent independent study with a special committee member, or a relevant workshop.

LING 6606 Historical Syntax

Fall. 4 credits. Prerequisite: LING 4403. J. Whitman.

LING 6615 Topics in Semantics

Fall. 4 credits. Prerequisite: LING 4421 or permission of instructor. M. Rooth.
Selected topics in semantic theory, focusing on recent literature.

LING 6616 Topics in Syntactic Theory

Fall. 4 credits, variable. Prerequisite: LING 4404 or permission of instructor. M. Diesing.
Examination of recent developments in syntactic theory, including “minimalist” approaches to phrase structure, derivations/representations and the nature of economy conditions, and parametric differences.

[LING 6617–6618 Hittite]

6617, fall; 6618, spring. 4 credits each semester. Prerequisites: for LING 6617, permission of instructor; for LING 6618, LING 6617 or permission of instructor. Next offered 2010–2011. M. Weiss.
Introduction to the cuneiform writing system and the grammar of Hittite, followed by the reading of selected texts.]

[LING 6619 Rigveda]

Fall. 4 credits. Prerequisite: permission of instructor. Next offered 2011–2012. Staff.]

[LING 6621 Avestan and Old Persian]

Fall. 4 credits. Prerequisite: basic knowledge of Sanskrit forms and morphology syntax. Next offered 2010–2011. M. Weiss.
Linguistically oriented readings of Old Persian and Avestan.]

[LING 6623–6624 Old Irish I, II]

6623, fall; 6624, spring. 4 credits each semester. Prerequisite: for LING 6624, LING 6623 or permission of instructor. Next offered 2010–2011. M. Weiss.]

[LING 6625 Middle Welsh]

Spring. 4 credits. Prerequisite: permission of instructor. Next offered 2011–2012. W. Harbert.
Students develop a reading knowledge of Middle Welsh through translating selections from prose and poetry. No familiarity with Welsh is assumed.]

LING 6633 Language Acquisition Seminar (also COGST/HD 6330)

Fall. 1–4 credits. Prerequisite: LING 4436 or equivalent or permission of instructor. B. Lust.
This seminar reviews and critiques current theoretical and experimental studies of first language acquisition, with a concentration on insights gained by cross-linguistic study of this area. Attention is also given to the development of research proposals.

LING 6634 Seminar in Philosophy of Language (also PHIL 6710)

Fall. 4 credits. M. Eklund.
For description, see PHIL 6710.

[LING 6635–6636 Indo-European Workshop]

6635, fall; 6636, spring. 4 credits each semester. Prerequisite: permission of instructor. Next offered 2010–2011. M. Weiss.

An assortment of subjects intended for students with previous training in Indo-European linguistics.]

[LING 6637 Introduction to Tocharian]

Fall. 4 credits. Prerequisite: knowledge of other ancient IE language and historical linguistics methods. Next offered 2010–2011. M. Weiss.
Introduction to the grammar of Tocharian A and B.]

LING 6645 Gothic

Fall. 4 credits. Prerequisite: LING 1101.
Offered every three years. W. Harbert.
Linguistic structure of Gothic, with extensive readings of Gothic texts.

[LING 6646 Old High German, Old Saxon (also GERST 6580)]

Spring. 4 credits. Prerequisite: LING 1101.
Highly recommended: reading knowledge of Modern German. Offered every three years; next offered 2010–2011. W. Harbert.
Combines a survey of the linguistic history and structure of Old High German and Old Saxon with extensive readings from the major documents in which they are recorded.]

[LING 6648 Speech Synthesis (also INFO 6648)]

Spring. 4 credits. Prerequisite: LING 4401, 4419, or permission of instructor. Offered alternate years; next offered 2010–2011. S. Hertz.

Investigates the nature of the acoustic structure of speech synthesis. The course may also be of interest to students in psychology, computer science, and cognitive science.]

[LING 6649 Structure of Old English (also ENGL 6170)]

Fall. 4 credits. Prerequisite: LING 4441.
Offered every three years. Next offered 2010–2011. W. Harbert.
Linguistic overview of Old English, with emphasis on phonology, morphology, and syntax.]

[LING 6659 Seminar in Vedic Philology (also ASIAN 6659, CLASS 7459)]

Fall. 4 credits. Prerequisite: two years of Sanskrit or permission of instructor. Next offered 2010–2011. M. Weiss.

A seminar for intensive reading of Vedic texts, primarily the Rig Veda. Attention will be given to the study of Vedic ritual and mythology, and to the later commentarial and performance traditions. Students will be familiarized with the various methods, primarily philological, necessary for the competent reading of Vedic texts.]

[LING 6662 Old Russian Texts (also RUSSA 6602)]

Spring. 4 credits. Prerequisite: LING 6663. Next offered 2010–2011. W. Browne.

Grammatical analysis and close reading of Old Russian texts.]

[LING 6663 Old Church Slavonic (also RUSSA 6601)]

Fall. 4 credits. Prerequisite: knowledge of Slavic or ancient Indo-European language. Prerequisite to LING 6662 and 6671. Next offered 2010–2011. W. Browne.

Grammar and reading of basic texts.]

[LING 6671 Comparative Slavic Linguistics (also RUSSA 6651)]

Fall. 4 credits. Prerequisites: LING 6663 taken previously or simultaneously, or permission of instructor. Offered alternate years. Next offered 2010–2011. W. Browne.

Sounds and forms of the Slavic languages and of prehistoric common Slavic; main historical developments leading to the modern languages.]

LING 7701-7702 Directed Research

7701, fall; 7702, spring. 1–4 credits. Times TBA. Staff.

LING 7710-7720 Seminar

Fall or spring. Credit TBA.

Seminars are offered according to faculty interest and student demand. Recent topics include: semantics; computational linguistics; language acquisition; and the nature of the interfaces between phonetics, phonology, and syntax.

MATHEMATICS

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L. Saloff-Coste, chair; A. Back, D. Barbasch, Y. Berest, L. Billera, K. Brown, X. Cao, R. Connelly, R. K. Dennis, R. Durrett, E. Dynkin, A. Frohmader, L. Gross, J. Guckenheimer, A. Hatcher, D. Henderson, T. Holm, J. Hubbard, M. Huntley, J. Hwang, Y. Ilyashenko, P. Kahn, M. Kassabov, B. Khoushainov, A. Knutson, T. Matsamura, G. Michler, F. Moore, J. Moore, C. Muscalu, A. Nerode, E. Nevo, M. Nussbaum, I. Peeva, R. Ramakrishna, T. Riley, A. Schatz, S. Sen, R. A. Shore, R. Sjamaar (DGS), J. Smillie, B. Speh, M. E. Stillman, R. Strichartz, E. Swartz, M. Terrell, R. Terrell, W. Thurston, R. Vale, A. Vladimirovsky, K. Vogtmann, L. Wahlbin (DUS), J. West. Emeritus: J. Bramble, S. Chase, M. Cohen, C. Earle, R. Farrell, H. Kesten, G. R. Livesay, M. Morley, L. E. Payne, M. Sweedler

Mathematics is the language of modern science; basic training in the discipline is essential for those who want to understand, as well as for those who want to take part in, the important scientific developments of our time.

Acquaintance with mathematics is also extremely useful for students in the social sciences and valuable for anyone interested in the full range of human culture and the ways of knowing the universe in which we live.

The Department of Mathematics faculty has strong groups specializing in algebra, number theory, combinatorics, real and complex analysis, Lie groups, topology and geometry, logic, probability and statistics, mathematical physics, and applied mathematics. Related departments at Cornell have specialists in computer science and operations research. Courses in these topics can be integrated readily into the mathematics major.

The department offers a rich variety of undergraduate courses, and many of its beginning graduate courses are suitable for advanced undergraduates as well. Under some conditions, a student may carry out an independent reading and research project for college credit under the supervision of a faculty member.

Members of the department are available to discuss with students the appropriate course for their levels of ability and interest, and students are urged to avail themselves of this help. Students who want to take any of the courses numbered 3000 or above are invited to confer with the instructor before enrolling.

Course Numbering System

The first digit of the course number indicates the level of the course: roughly, 1 and 2 indicate underclass courses; 3 and 4, upperclass courses; 5, professional-level and mathematics education courses; 6 and 7, graduate courses. Within the MATH subject area, the second digit often indicates the subject matter: 0, general; 1 and 2, analysis; 3 and 4, algebra and combinatorics; 5 and 6, topology and geometry; 7, probability and statistics; 8, logic; 9, other.

In the MATH subject area, conversion of course numbers from the old 3-digit system to the new 4-digit system was accomplished in most cases by adding a 0 as the 4th digit. Exceptions are as follows:

MATH 005 becomes 1005,
MATH 006 becomes 1006,
MATH 011 becomes 1011,
MATH 012 becomes 1012,
MATH 103 becomes 1300,
MATH 105 becomes 1105,
MATH 106 becomes 1106,
MATH 109 becomes 1009.

Advanced Placement

Freshmen who have had some calculus should carefully read "Advanced Placement," p. 8. Those who have not taken an advanced placement exam should take a placement test at Cornell during fall orientation. For guidance in selecting an appropriate course, please consult *First Steps in Math*, published on the Mathematics Department web site (www.math.cornell.edu) under "Courses."

The Major

The mathematics major adapts to a number of purposes. It can emphasize the theoretical or the applied. It can be appropriate for professionals and nonprofessionals alike, and can be broad or narrow. It can also be combined easily with serious study in another subject in the physical, biological, or social

sciences by means of a double major and/or concentration. (See "Double Majors" below for more information.) Questions concerning the major should be brought to a member of the Mathematics Major Committee.

Prerequisites

Students are admitted to the major after successfully completing a semester of multivariable calculus and a semester of linear algebra. The department recommends either MATH 2210–2220 or 2230–2240 with grades of B– or better. Alternative prerequisites are MATH 1920 and 2940 with grades of B– or better or MATH 2130 and 2310 with grades of B+ or better. A 3- or 4-credit computer programming course with a grade of C– or better is also required for acceptance to the major. Eligible courses include: CS 1110, 1112, 1113, 1114, and 2110.

Requirements

Students must complete nine courses, as described in items 1–3 below, under the following constraints:

- At least two of the MATH courses taken must be at the 4000 level (or above). (Students graduating before May 2011 are exempt from this constraint.)
- A course may be counted toward the major only if it is taken for a letter grade and a grade of C– or better is received for the course.
- No course may be used to satisfy more than one requirement for the major.
- 2-credit courses count as half courses.
- 5000-level MATH courses do not count toward the major.

Major advisors may make adjustments to the major requirements upon request from an advisee, provided the intent of the requirements is met. In particular, many suitable graduate courses are not listed here.

1. Two courses in algebra. Eligible courses are: MATH 4310 or 4330; MATH 4320 or 4340; MATH 4370; MATH 4500; MATH 3320; MATH 3360.
2. Two courses in analysis. Eligible courses are: MATH 3110, 3210, 3230, 4130, 4140, 4180, 4200, 4220, 4240, 4250 (also CS 4210), 4260 (also CS 4220), 4280.
3. Five further high-level mathematical courses. *The seven alternatives (a–g) below do not exhaust the possibilities. A mathematics major interested in a concentration in a subject different from those below may develop a suitable individual program in consultation with his or her major advisor.*
 - a. **Concentration in Mathematics:**
 - i. Four additional MATH courses numbered 3000 or above. For students graduating in May 2011 or later, at least one of the four courses must be among the following geometry/topology courses: MATH 3560, 4500, 4510, 4520, 4530, 4540, 4550.
 - ii. One course dealing with mathematical models. Any course from outside mathematics with serious mathematical content and dealing with scientific matters. Serious mathematical content includes, but is not limited to,

- extensive use of calculus or linear algebra. Eligible courses include any course from another department that would satisfy one of the concentrations, as well as CS 2110, MATH 3840/PHIL 3300, MATH 4810/PHIL 4310, MATH 4820/PHIL 4311, MATH 4830/PHIL 4312, PHYS 1116, PHYS 2208, PHYS 2213, and PHYS 2217. Other 1000-level physics courses and PHYS 2207 may *not* be used, but some courses in other fields may be accepted.
- b. **Concentration in Computer Science:** Five additional courses from (iii) and (iv) below, of which at least one is from (iii) and three are from (iv).
 - iii. Mathematics courses numbered 3000 or above.
 - iv. Computer science courses with significant mathematical content. Eligible courses are: CS 3220, 3810, 4110, 4210 (also MATH 4250), 4220 (also MATH 4260), 4520, 4620, 4700, 4702, 4740, 4780, 4782, 4812, 4820, 4830, 4850, and 4860.
 - c. **Concentration in Economics:** Five additional courses from (v), (vi), and (vii) below, as follows: one course from (v), three courses from (vi), and a fifth course from any of (v), (vi), or (vii).
 - v. Mathematics courses numbered 3000 or above.
 - vi. Economics courses with significant mathematical content. Eligible courses are: ECON 3190/6190, 3200/6200, 3250, 3270, 3680, 4160, 4190, 4760/6760, 4770/6770, 6090, 6100, 6110, 6130, 6140, 7170, 7180, 7480, 7490, 7560. Only two of the econometrics courses (3200/6200, 3250, 3270, 7480, 7490) are allowed.
 - vii. Courses in operations research with significant mathematical content and dealing with material of interest in economics. Eligible courses are: ORIE 3300, 3310, 4320, 4350, 4600, 4710, 4740, 5600 and 5610.
 - d. **Concentration in Mathematical Biology:** Five additional courses from (viii) and (ix) below, with three courses from (viii) and two courses from (ix).
 - viii. Biology courses that have mathematical content or provide background necessary for work at the interface between biology and mathematics. Eligible courses are: BIOEE/MATH 3620, BIOEE 4600, BIONB 4220, BTRY 4080, 4090, 4820, 4830, 4840.
 - ix. Mathematics courses numbered above 3000. Particularly appropriate are MATH 4200 and 4710.
 - e. **Concentration in Mathematical Physics:** Five additional courses from (x) and (xi) below, of which at least one is from (x) and three are from (xi).

- x. Mathematics courses in analysis, geometry, algebra and combinatorics, probability and statistics, and mathematical logic. Eligible courses are: MATH 3110, 3210, 3230, 4010, 4130, 4140, 4200, 4180 or 4220, 4240, 4250 (also CS 4210), 426 (also CS 4220), 4280, 4310 or 4330, 4320 or 4340, 4370, 4410, 4420, 4500, 4510, 4520, 4530, 4540, 4550, 4710, 4720, 4810, 4820, 4830, 4860.
 - xi. Physics courses that make significant use of advanced mathematics. Eligible courses are: PHYS 3314, 3316, 3318, 3323, 3327, 3341, 4443, 4444, 4445, 4454, 4455, 4480, 4481.
- f. **Concentration in Operations Research:** Five additional courses from (xii) and (xiii) below, of which at least one is from (xii) and three are from (xiii).
 - xii. Mathematics courses numbered 3000 or above.
 - xiii. Courses in operations research in which the primary focus involves mathematical techniques. Eligible courses are: ORIE 3300, 3310, 3500, 3510, 4150, 4300, 4320, 4330, 4350, 4360, 4370, 4520, 4540, 4600, 4630, 4710, 4740, 4850, 5600, 5610, and 5640.
 - g. **Concentration in Statistics:** Five additional courses from (xiv), (xv), and (xvi) below, which include both from (xv) and at least two from (xvi). (MATH 1710 is also recommended for students who have not had experience with real-world data, although it will not count toward any of the math major requirements. It should be taken or audited before or concurrent with MATH 4710.)
 - xiv. Mathematics courses numbered 3000 or above.
 - xv. MATH 4710 and 4720.
 - xvi. Courses in other departments with significant content in probability and statistics, complementing (xiv). Eligible courses are: BTRY 3020, 4820, 6020, 6030, 6040; CS 4782; ORIE 3510, 4520, 4540, 4600, 4630, 4710 (half course), 4740, 5600, 5610; ILRST 3120, 4100, 4110; and ECON 3200.

Double Majors

A double major with computer science, economics, or physics can be facilitated by the corresponding concentrations described above. The Departments of Computer Science and Economics permit double majors to use courses in the corresponding concentrations to satisfy the requirements of both majors. The Physics Department also permits double counting, but only if the student completes the physics major with an inside concentration. Students should consult the appropriate departments for any further conditions.

Senior Thesis

A senior thesis can form a valuable part of a student's experience in the mathematics major. It is intended to allow students to conduct an in-depth investigation not possible in regular

course work. The work should be independent and creative. It can involve the solution of a serious mathematics problem, or it can be an expository work, or variants of these. Conducting independent research, paying careful attention to exposition in the finished written product, and the delivery of an optional oral presentation can have a lasting positive impact on a student's educational and professional future.

Honors

The Department of Mathematics awards honors (*cum laude*) and high honors (*magna cum laude* and *summa cum laude*) to graduating mathematics majors who have performed outstandingly in the major program.

The awards are determined by the Mathematics Major Committee in the latter part of the semester before graduation. The committee will primarily be looking for excellent performance in mathematics courses, particularly in challenging courses at the 4000 level or beyond. Participation in the honors seminar (MATH 4010) for one semester, or independent study at a high performance level can also contribute to honors. Students interested in any level of honors should consult their major advisors or a member of the Mathematics Major Committee concerning suitable courses. Outstanding performance in graduate classes or an excellent senior thesis can contribute to high honors.

Teacher Education in Mathematics

For information on the various possibilities for students considering teaching mathematics in schools, go to www.math.cornell.edu/Undergraduate/Teaching.

Precalculus

Students who need to take Calculus I (MATH 1106 or 1110) but are lacking the necessary prerequisites may take MATH 1000, MATH 1009, or BTRY 1150 to prepare. These courses do not carry credit toward graduation in the Arts College.

Calculus Sequences

Students should consult their advisors and keep major prerequisites in mind when planning a suitable program. The following are general recommendations.

1. Students who expect to major in mathematics or a science for which a strong math background is recommended, should take MATH 1110–1120 or MATH 1110–1220 and continue with MATH 2210–2220 or 2230–2240. (MATH 1910 may be substituted for MATH 1120.)
2. Students who have an aversion to mathematical theory might be happier with MATH 1910–1920–2930–2940, MATH 1110–1120–2130, or MATH 1110–2310.
3. MATH 1910–1920–2930–2940 is required for students in the engineering college and recommended by some advisors in fields strongly related to the mathematical and physical sciences, such as astronomy, computer science, physics, and physical chemistry.
4. MATH 1110–1120–2130 is a good choice for students who need to master the basic techniques of calculus but whose majors will not require a substantial amount of

mathematics, including chemistry and economics majors.

- MATH 1110-2310 is an option for students who need some linear algebra but not a full year of calculus.

Switching between calculus sequences is often difficult, especially at the 2000 level. Students should not attempt such a switch without consulting the director of undergraduate studies.

Special-Purpose Sequences

Students who will take no more than two semesters of mathematics can gain a broader view of the subject by taking one semester of calculus and one non-calculus mathematics course. The following options are particularly useful for students in the life and social sciences and will satisfy the mathematics requirement for most medical schools.

- MATH 1105-1106 provides a one-year introduction to the mathematical topics that are most useful to biologists and social scientists. (MATH 1110 may be substituted for MATH 1106.)
- An introductory statistics course (MATH 1710, for example), taken before or after a semester of calculus (MATH 1106 or MATH 1110), teaches students how to work with data and can be more useful in some disciplines than a second semester of calculus.

Students who want two semesters of calculus are advised to take the first two semesters of one of the calculus sequences, but students with excellent performance in MATH 1106 may follow that course with MATH 1120 or 1220.

Courses with Overlapping Content

Because the department offers many courses with overlapping content, students must choose their courses carefully to ensure that they will receive credit for each course they take. Listed below are groups of courses that have similar content. Students will receive credit for only one of the courses in each group.

MATH 1106, 1110
 MATH 1120, 1220, 1910
 MATH 1920, 2130, 2220, 2240
 MATH 2210, 2230, 2310, 2940
 MATH 3230, 4280
 MATH 4310 and 4330
 MATH 4320 and 4340
 MATH 4710, ECON 3190, BTRY 4080
 MATH 4720, ECON 3190, BTRY 4090

Note: Courses with overlapping content are not necessarily equivalent courses. Students are encouraged to consult a mathematics faculty member when choosing between them.

Undergraduate Course Offerings

Please visit www.math.cornell.edu for further information and up-to-the-minute corrections. For guidance in selecting an appropriate course, please consult *First Steps in Math*, published on the mathematics department web site under "Courses."

Foundation courses: 1105, 1106, 1110, 1120, 1220, 1910, 1920, 2130, 2210, 2220, 2230, 2240, 2310, 2930, 2940

Mathematics Education: 4510

History of Mathematics: 4030

General and Liberal Arts Courses: 1300, 1340, 1350, 1710, 3040, 4010

Analysis: 3110, 3210, 4130, 4140, 4180

Algebra and Number Theory: 3320, 3360, 4310, 4320, 4330, 4340, 4370, 4500

Combinatorics: 4410, 4420, 4550

Geometry and Topology: 3560, 4500, 4510, 4520, 4530, 4540

Probability and Statistics: 1710, 2710, 4710, 4720, 4740

Mathematical Logic: 2810, 3840, 4810, 4820, 4860

Applied Analysis and Differential Equations: 3230, 3620, 4200, 4220, 4240, 4250, 4260, 4280

MATH 1000 Calculus Preparation

Fall. 2 transcript credits only; cannot be used toward graduation. Prerequisite: permission of instructor. Interested students must complete a questionnaire at 310 Malott Hall to request admittance to the course. Priority will be given to students who need the course to prepare for MATH 1106 or 1110.

Introduces a wide variety of topics of algebra and trigonometry that have applications in various disciplines. Emphasis is on the development of linear, polynomial, rational, trigonometric, exponential, and logarithmic functions. Students will have a better understanding of the behavior of these functions in their application to calculus because of the strong emphasis on graphing. Application of these mathematical ideas is addressed in problem-solving activities.

MATH 1005 Academic Support for MATH 1105

Fall. 1 transcript credit only; cannot be used toward graduation. Reviews material presented in MATH 1105 lectures, provides problem-solving techniques and tips as well as prelim review. Provides further instruction for students who need reinforcement. Not a substitute for MATH 1105 lectures or recitations.

MATH 1006 Academic Support for MATH 1106

Spring. 1 transcript credit only; cannot be used toward graduation. Reviews material presented in MATH 1106 lectures, provides problem-solving techniques and tips as well as prelim review. Provides further instruction for students who need reinforcement. Not a substitute for MATH 1106 lectures or recitations.

MATH 1009 Precalculus Mathematics

Summer. 3 transcript credits only; cannot be used toward graduation. Designed to prepare students for MATH 1110. Reviews algebra, trigonometry, logarithms, and exponentials.

MATH 1011 Academic Support for MATH 1110

Fall, spring. 1 transcript credit only; cannot be used toward graduation. Reviews material presented in MATH 1110 lectures, provides problem-solving techniques and tips as well as prelim review. Provides further instruction for students who need reinforcement. Not a substitute for MATH 1110 lectures or recitations.

MATH 1012 Academic Support for MATH 1120

Fall, spring. 1 transcript credit only; cannot be used toward graduation. Reviews material presented in MATH 1120 lectures, provides problem-solving techniques and tips as well as prelim review. Provides further instruction for students who need reinforcement. Not a substitute for MATH 1120 lectures or recitations.

MATH 1105 Finite Mathematics for the Life and Social Sciences (MQR)

Fall. 3 credits. Prerequisite: three years high school mathematics, including trigonometry and logarithms. Introduction to linear algebra, probability, and Markov chains that develops the parts of the theory most relevant for applications. Specific topics include equations of lines, the method of least squares, solutions of linear systems, matrices; basic concepts of probability, permutations, combinations, binomial distribution, mean and variance, and the normal approximation to the binomial distribution. Examples from biology and the social sciences are used.

MATH 1106 Calculus for the Life and Social Sciences (MQR)

Spring. 3 credits. Prerequisite: three years of high school mathematics (including trigonometry and logarithms) or MATH 1000, MATH 1009, or BTRY 1150. For students planning to take MATH 1120, MATH 1110 is recommended rather than 1106. *Students may not receive credit for both MATH 1106 and MATH 1110.* Introduction to differential and integral calculus, partial derivatives, elementary differential equations. Examples from biology and the social sciences are used.

MATH 1110 Calculus I (MQR)

Fall, spring, summer. 4 credits. Prerequisite: three years of high school mathematics (including trigonometry and logarithms) or MATH 1000, MATH 1009, or BTRY 1150. *Students may not receive credit for both MATH 1110 and MATH 1106.* Topics include functions and graphs, limits and continuity, differentiation and integration of algebraic, trigonometric, inverse trig, logarithmic, and exponential functions; applications of differentiation, including graphing, max-min problems, tangent line approximation, implicit differentiation, and applications to the sciences; the mean value theorem; and antiderivatives, definite and indefinite integrals, the fundamental theorem of calculus, substitution in integration, the area under a curve. Graphing calculators are used, and their pitfalls are discussed, as applicable to the above topics. MATH 1110 can serve as a one-semester introduction to calculus or as part of a two-semester sequence in which it is followed by MATH 1120 or 1220.

MATH 1120 Calculus II (MQR)

Fall, spring. 4 credits. Prerequisite: MATH 1110 with grade of C or better or excellent performance in MATH 1106. Those who do well in MATH 1110 and expect to major in mathematics or strongly mathematics-related field should take 1220 instead of 1120. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 1120, MATH 1220, MATH 1910.*

Focuses on integration: applications, including volumes and arc length; techniques of integration, approximate integration with error

estimates, improper integrals, differential equations (separation of variables, initial conditions, systems, some applications). Also covers infinite sequences and series: definition and tests for convergence, power series, Taylor series with remainder, and parametric equations.

MATH 1220 Honors Calculus II (MQR)

Fall. 4 credits. Prerequisite: one semester of calculus with high performance or permission of department. Students planning to continue with MATH 2130 are advised to take 1120 instead of this course. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 1220, MATH 1120, MATH 1910.*

Takes a more theoretical approach to calculus than MATH 1120. Topics include differentiation and integration of elementary transcendental functions, techniques of integration, applications, polar coordinates, infinite series, and complex numbers, as well as an introduction to proving theorems.

MATH 1300 Mathematical Explorations (MQR)

Fall. 3 credits.

For students who wish to experience how mathematical ideas naturally evolve. The course emphasizes ideas and imagination as opposed to techniques and calculations. The homework involves students in actively investigating mathematical ideas. Topics vary depending on the instructor. Some assessment is done through writing assignments.

MATH 1340 Mathematics and Politics (MQR)

Spring. 3 credits.

We apply mathematical reasoning to some problems arising in the social sciences. We discuss game theory and its applications to political and historical conflicts. Power indices are introduced and used to analyze some political institutions. The problem of finding a fair election procedure to choose among three or more alternatives is analyzed.

MATH 1350 The Art of Secret Writing (MQR)

Fall, summer. 3 credits. Prerequisite: three years high school mathematics.

Examines classical and modern methods of message encryption, decryption, and cryptanalysis. Mathematical tools are developed to describe these methods (modular arithmetic, probability, matrix arithmetic, number theory), and some of the fascinating history of the methods and people involved is presented.

MATH 1600 Totally Awesome Mathematics

Spring. 2 credits. Prerequisite: one semester calculus. (AP credit is sufficient.)

Mathematics is a broad and varied field that extends far beyond calculus and the high school curriculum. This course will introduce exciting mathematical topics to stretch your imagination and give you a feel for the great variety of problems that mathematicians study. Each week a different lecturer will present a new topic and fun problems for discussion. Topics will vary from year to year, but may include the following: encryption and number theory, non-Euclidean geometry, knots and surfaces, combinatorics of polyhedra, the Heisenberg Uncertainty Principle and signal processing, unsolvable problems and noncomputable functions, card shuffling and

probability, symmetry and solutions of polynomial equations.

MATH 1710 Statistical Theory and Application in the Real World (MQR)

Fall, spring, summer. 4 credits. Prerequisite: high school mathematics. No previous familiarity with computers presumed. No credit if taken after ECON 3190, 3200, or 3210.

Introductory statistics course discussing techniques for analyzing data occurring in the real world and the mathematical and philosophical justification for these techniques. Topics include population and sample distributions, central limit theorem, statistical theories of point estimation, confidence intervals, testing hypotheses, the linear model, and the least squares estimator. The course concludes with a discussion of tests and estimates for regression and analysis of variance (if time permits). The computer is used to demonstrate some aspects of the theory, such as sampling distributions and the Central Limit Theorem. In the lab portion of the course, students learn and use computer-based methods for implementing the statistical methodology presented in the lectures.

MATH 1910 Calculus for Engineers (MQR)

Fall, spring, summer. 4 credits. Prerequisite: three years high school mathematics including trigonometry and logarithms and at least one course in differential and integral calculus. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 1910, MATH 1120, MATH 1220.*

Essentially a second course in calculus. Topics include techniques of integration, finding areas and volumes by integration, exponential growth, partial fractions, infinite sequences and series, and power series.

MATH 1920 Multivariable Calculus for Engineers (MQR)

Fall, spring, summer. 4 credits. Prerequisite: MATH 1910. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 1920, MATH 2130, MATH 2220, MATH 2240.*

Introduction to multivariable calculus. Topics include partial derivatives, double and triple integrals, line integrals, vector fields, Green's theorem, Stokes' theorem, and the divergence theorem.

MATH 2130 Calculus III (MQR)

Fall, spring. 4 credits. Prerequisite: MATH 1120, 1220, or 1910. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 2130, MATH 1920, MATH 2220, MATH 2240.*

Designed for students who wish to master the basic techniques of multivariable calculus, but whose major will not require a substantial amount of mathematics. Topics include vectors and vector-valued functions; multivariable and vector calculus including multiple and line integrals; first- and second-order differential equations with applications; systems of differential equations; and elementary partial differential equations. The course may emphasize different topics in the syllabus in different semesters, such as Green's theorem, Stokes' theorem, and the divergence theorem.

MATH 2210 Linear Algebra (MQR)

Fall, spring. 4 credits. Prerequisite: two semesters of calculus with high performance or permission of department. Recommended for students who plan to major in mathematics or a related field. For a more applied version of this course, see MATH 2310. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 2210, MATH 2230, MATH 2310, MATH 2940.*

Topics include vector algebra, linear transformations, matrices, determinants, orthogonality, eigenvalues, and eigenvectors. Applications are made to linear differential equations.

MATH 2220 Multivariable Calculus (MQR)

Fall, spring. 4 credits. Prerequisite: MATH 2210. Recommended for students who plan to major in mathematics or a related field. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 2220, MATH 1920, MATH 2130, MATH 2240.*

Differential and integral calculus of functions in several variables, line and surface integrals as well as the theorems of Green, Stokes, and Gauss.

MATH 2230 Theoretical Linear Algebra and Calculus (MQR)

Fall. 4 credits. Prerequisite: two semesters of calculus with grade of A- or better, or permission of instructor. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 2230, MATH 2210, MATH 2310, MATH 2940.*

MATH 2230–2240 provides an integrated treatment of linear algebra and multivariable calculus designed for students who have been highly successful in their previous calculus courses. The material is presented at a higher theoretical level than in 2210–2220. Topics in 2230 include vectors, matrices, and linear transformations; differential calculus of functions of several variables; inverse and implicit function theorems; quadratic forms, extrema, and manifolds; multiple and iterated integrals.

MATH 2240 Theoretical Linear Algebra and Calculus (MQR)

Spring. 4 credits. Prerequisite: MATH 2230. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 2240, MATH 1920, MATH 2130, MATH 2220.*

Topics include vector fields; line integrals; differential forms and exterior derivative; work, flux, and density forms; integration of forms over parametrized domains; and Green's, Stokes', and divergence theorems.

MATH 2310 Linear Algebra with Applications (MQR)

Fall, spring. 3 credits. Prerequisite: MATH 1110 or equivalent. Students who plan to major in mathematics should take MATH 2210 or 2940. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 2310, MATH 2210, MATH 2230, MATH 2940.*

Introduction to linear algebra for students who wish to focus on the practical applications of the subject. A wide range of applications are discussed and computer software may be used. The main topics are systems of linear equations, matrices, determinants, vector spaces, orthogonality, and eigenvalues. Typical

applications are population models, input/output models, least squares, and difference equations.

MATH 2710 A Second Course in Statistics

Spring. 4 credits. Prerequisite: two semesters of calculus (MATH 1110-1120 or equivalent) or permission of instructor. Recommended: an introductory statistics course such as AP statistics, MATH 1710, ILRST 2100, or similar.

Designed for students who wish to build on their knowledge of basic statistics to obtain a more modern and advanced perspective on the field. The treatment will be elementary and accessible to students of the sciences and other fields, but a good working knowledge of calculus is assumed. An extended review of probability and random variables will be given first. Statistical inference topics to be discussed include estimation, testing hypotheses, nonparametric methods, multiple regression, and the analysis of variance. Both classical and Bayesian statistical methods are developed in an integrated presentation. Computer exercises will supplement the theory. With some effort, students with no prior knowledge of statistics should be able to master the course.

MATH 2810 Deductive Logic (also PHIL 3310) (MQR)

Fall. 4 credits.

For description, see PHIL 3310.

MATH 2930 Differential Equations for Engineers (MQR)

Fall, spring, summer. 4 credits. Prerequisite: MATH 1920. Taking MATH 2930 and 2940 simultaneously is not recommended.

Introduction to ordinary and partial differential equations. Topics include: first-order equations (separable, linear, homogeneous, exact); mathematical modeling (e.g., population growth, terminal velocity); qualitative methods (slope fields, phase plots, equilibria, and stability); numerical methods; second-order equations (method of undetermined coefficients, application to oscillations and resonance, boundary-value problems and eigenvalues); Fourier series; linear partial differential equations (heat flow, waves, the Laplace equation); and linear systems of ordinary differential equations.

MATH 2940 Linear Algebra for Engineers (MQR)

Fall, spring, summer. 4 credits. Prerequisite: MATH 1920. Taking MATH 2930 and 2940 simultaneously is not recommended. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 2940, MATH 2210, MATH 2230, MATH 2310.*

Linear algebra and its applications. Topics include matrices, determinants, vector spaces, eigenvalues and eigenvectors, orthogonality and inner product spaces; applications include brief introductions to difference equations, Markov chains, and systems of linear ordinary differential equations. May include computer use in solving problems.

MATH 3040 Prove It! (MQR)

Spring. 4 credits. Prerequisite: MATH 2210, 2230, 2940, or permission of instructor.

In mathematics, the methodology of proof provides a central tool for confirming the validity of mathematical assertions, functioning much as the experimental method does in the physical sciences. In this course, students learn

various methods of mathematical proof, starting with basic techniques in propositional and predicate calculus and in set theory and combinatorics, and then moving to applications and illustrations of these via topics in one or more of the three main pillars of mathematics: algebra, analysis, and geometry. Since cogent communication of mathematical ideas is important in the presentation of proofs, the course emphasizes clear, concise exposition. This course is useful for all students who wish to improve their skills in mathematical proof and exposition, or who intend to study more advanced topics in mathematics.

MATH 3110 Introduction to Analysis (MQR)

Fall, spring. 4 credits. Prerequisites: MATH 2210-2220, 2230-2240, or 1920 and 2940.

Provides a transition from calculus to real analysis. Topics include rigorous treatment of fundamental concepts in calculus: including limits and convergence of sequences and series, compact sets; continuity, uniform continuity and differentiability of functions. Emphasis is placed upon understanding and constructing mathematical proofs.

MATH 3210 Manifolds and Differential Forms (MQR)

Fall. 4 credits. Prerequisites: multivariable calculus and linear algebra (e.g., MATH 2210-2220, 2230-2240, or 1920 and 2940).

A manifold is a type of subset of Euclidean space that has a well-defined tangent space at every point. Such a set is amenable to the methods of multivariable calculus. After a review of some relevant calculus, this course investigates manifolds and the structures that they are endowed with, such as tangent vectors, boundaries, orientations, and differential forms. The notion of a differential form encompasses such ideas as surface and volume forms, the work exerted by a force, the flow of a fluid, and the curvature of a surface, space, or hyperspace. The course re-examines the integral theorems of vector calculus (Green, Gauss, and Stokes) in the light of differential forms and apply them to problems in partial differential equations, topology, fluid mechanics, and electromagnetism.

[MATH 3230 Introduction to Differential Equations (MQR)

Fall. 4 credits. Prerequisites: multivariable calculus and linear algebra (e.g., MATH 2210-2220, 2230-2240, or 1920 and 2940), or permission of instructor. *Students may not receive credit for both MATH 3230 and MATH 4280.* Next offered 2010-2011.

Intended for students who want a brief one-semester introduction to the theory and techniques of both ordinary and partial differential equations.]

MATH 3320 Introduction to Number Theory (MQR)

Fall. 4 credits. Prerequisite: MATH 2210, 2230, 2310, or 2940.

An introductory course on number theory, the branch of algebra that studies the deeper properties of integers and their generalizations. Usually includes most of the following topics: the Euclidean algorithm, continued fractions, Pythagorean triples, Diophantine equations such as Pell's equation, congruences, quadratic reciprocity, binary quadratic forms, Gaussian integers, and factorization in quadratic number fields. May include a brief introduction to Fermat's Last Theorem.

MATH 3360 Applicable Algebra (MQR)

Spring. 4 credits. Prerequisite: MATH 2210, 2230, 2310, or 2940.

Introduction to the concepts and methods of abstract algebra and number theory that are of interest in applications. Covers the basic theory of groups, rings and fields and their applications to such areas as public-key cryptography, error-correcting codes, parallel computing, and experimental designs. Applications include the RSA cryptosystem and use of finite fields to construct error-correcting codes and Latin squares. Topics include elementary number theory, Euclidean algorithm, prime factorization, congruences, theorems of Fermat and Euler, elementary group theory, Chinese remainder theorem, factorization in the ring of polynomials, and classification of finite fields.

MATH 3560 Groups and Geometry (MQR)

Spring. 4 credits. Prerequisite: MATH 2210, 2230, 2310, or 2940. Prior knowledge of group theory is not a prerequisite.

A geometric introduction to the algebraic theory of groups, through the study of symmetries of planar patterns and 3-dimensional regular polyhedra. Besides studying these algebraic and geometric objects themselves, the course also provides an introduction to abstract mathematical thinking and mathematical proofs, serving as a bridge to the more advanced 4000-level courses. Abstract concepts covered include: axioms for groups; subgroups and quotient groups; isomorphisms and homomorphisms; conjugacy; group actions, orbits, and stabilizers. These are all illustrated concretely through the visual medium of geometry.

[MATH 3620 Dynamic Models in Biology (also BIOEE 3620) (MQR)

Spring. 4 credits. Prerequisite: two semesters of introductory biology (BIOG 1101-1102, 1105-1106, 1107-1108, 1109-1110, or equivalent) and completion of math requirements for biological sciences major or equivalent. Next offered 2010-2011.

For description, see BIOEE 3620.]

[MATH 4010 Honors Seminar: Topics in Modern Mathematics (MQR)

Spring. 4 credits. Prerequisite: two mathematics courses numbered 3000 or higher or permission of instructor. Next offered 2010-2011.

Participatory seminar aimed at introducing senior and junior mathematics majors to challenging problems and areas of modern mathematics. Helps students develop research and expository skills.]

MATH 4030 History of Mathematics # (MQR)

Spring. 4 credits. Prerequisite: two mathematics courses above 3000, or permission of instructor.

Survey of the development of mathematics from antiquity to the present, with an emphasis on the achievements, problems, and mathematical viewpoints of each historical period and the evolution of such basic concepts as number, geometry, construction, and proof. Readings from original sources in translation. Students are required to give oral and written reports. In addition to the lecture, a problem session (to be arranged) will meet twice a week.

MATH 4130 Honors Introduction to Analysis I (MQR)

Fall, spring, 4 credits. Prerequisite: high level of performance in MATH 2210–2220, 2230–2240, or 1920 and 2940 and familiarity with proofs. Students who do not intend to take MATH 4140 are encouraged to take MATH 4130 in the spring.

Introduction to the rigorous theory underlying calculus, covering the real number system and functions of one variable. Based entirely on proofs. The student is expected to know how to read and, to some extent, construct proofs before taking this course. Topics typically include construction of the real number system, properties of the real number system, continuous functions, differential and integral calculus of functions of one variable, sequences and series of functions.

MATH 4140 Honors Introduction to Analysis II (MQR)

Spring, 4 credits. Prerequisite: MATH 4130. Proof-based introduction to further topics in analysis. Topics may include the Lebesgue measure and integration, functions of several variables, differential calculus, implicit function theorem, infinite dimensional normed and metric spaces, Fourier series, ordinary differential equations.

MATH 4180 Introduction to the Theory of Functions of One Complex Variable (MQR)

Spring, 4 credits. Prerequisite: MATH 2230–2240, 3110, or 4130 or permission of instructor.

Theoretical and rigorous introduction to complex variable theory. Topics include complex numbers, differential and integral calculus for functions of a complex variable including Cauchy's theorem and the calculus of residues, elements of conformal mapping. Students interested in the applications of complex analysis should consider MATH 4220.

MATH 4200 Differential Equations and Dynamical Systems (MQR)

Fall, 4 credits. Prerequisite: high level of performance in MATH 2210–2220, 2230–2240, 1920 and 2940, or permission of instructor.

Covers ordinary differential equations in one and higher dimensions: qualitative, analytic, and numerical methods. Emphasis is on differential equations as models and the implications of the theory for the behavior of the system being modeled and includes an introduction to bifurcations.

MATH 4220 Applied Complex Analysis (MQR)

Spring, 4 credits. Prerequisite: MATH 2210–2220, 2230–2240, 1920 and 2940, or 2130 and 2310. Undergraduates who plan to attend graduate school should take MATH 4180.

Covers complex variables, Fourier transforms, Laplace transforms and applications to partial differential equations. Additional topics may include an introduction to generalized functions.

[MATH 4240 Wavelets and Fourier Series (MQR)

Spring, 4 credits. Prerequisite: MATH 2210–2220, 2230–2240, 1920 and 2940, or permission of instructor. Next offered 2010–2011.

Both Fourier series and wavelets provide methods to represent or approximate general

functions in terms of simple building blocks. Such representations have important consequences, both for pure mathematics and for applications. Emphasis is on clear statements of results and key ideas of proofs, working out examples, and applications.]

MATH 4250 Numerical Analysis and Differential Equations (also CS 4210) (MQR)

Fall, 4 credits. Prerequisites: MATH 2210 or 2940 or equivalent, one additional mathematics course numbered 3000 or above, and knowledge of programming.

Introduction to the fundamentals of numerical analysis: error analysis, approximation, interpolation, numerical integration. In the second half of the course, the above are used to build approximate solvers for ordinary and partial differential equations. Strong emphasis is placed on understanding the advantages, disadvantages, and limits of applicability for all the covered techniques. Computer programming is required to test the theoretical concepts throughout the course. MATH 4250 (CS 4210) and MATH 4260 (CS 4220) provide a comprehensive introduction to numerical analysis; these classes can be taken independently from each other and in either order.

MATH 4260 Numerical Analysis: Linear and Nonlinear Problems (also CS 4220) (MQR)

Spring, 4 credits. Prerequisites: MATH 2210 or 2940 or equivalent, one additional mathematics course numbered 3000 or above, and knowledge of programming.

Introduction to the fundamentals of numerical linear algebra: direct and iterative methods for linear systems, eigenvalue problems, singular value decomposition. In the second half of the course, the above are used to build iterative methods for nonlinear systems and for multivariate optimization. Strong emphasis is placed on understanding the advantages, disadvantages, and limits of applicability for all the covered techniques. Computer programming is required to test the theoretical concepts throughout the course. MATH 4250 (CS 4210) and MATH 4260 (CS 4220) provide a comprehensive introduction to numerical analysis; these classes can be taken independently from each other and in either order.

MATH 4280 Introduction to Partial Differential Equations (MQR)

Spring, 4 credits. Prerequisite: MATH 2210–2220, 2230–2240, or 1920 and 2940, or permission of instructor. *Students may not receive credit for both MATH 3230 and MATH 4280.*

Topics are selected from first-order quasilinear equations, classification of second-order equations, with emphasis on maximum principles, existence, uniqueness, stability, Fourier series methods, approximation methods.

MATH 4310 Linear Algebra (MQR)

Fall, 4 credits. Prerequisite: MATH 2210, 2230, 2310, or 2940. Undergraduates who plan to attend graduate school in mathematics should take MATH 4330–4340. *Students may not receive credit for both MATH 4310 and MATH 4330.*

Introduction to linear algebra, including the study of vector spaces, linear transformations, matrices, and systems of linear equations. Additional topics are quadratic forms and inner product spaces, canonical forms for

various classes of matrices and linear transformations.

MATH 4320 Introduction to Algebra (MQR)

Spring, 4 credits. Prerequisite: MATH 3320, 3360, 4310 or 4330, or permission of instructor. Undergraduates who plan to attend graduate school in mathematics should take MATH 4330–4340. *Students may not receive credit for both MATH 4320 and MATH 4340.*

Introduction to various topics in abstract algebra, including groups, rings, fields, factorization of polynomials and integers, congruences, and the structure of finitely generated abelian groups. Optional topics are modules over Euclidean domains and Sylow theorems.

MATH 4330 Honors Linear Algebra (MQR)

Fall, 4 credits. Prerequisite: high level of performance in MATH 2210, 2230, 2310, or 2940. *Students may not receive credit for both MATH 4310 and MATH 4330.*

Honors version of a course in advanced linear algebra, which treats the subject from an abstract and axiomatic viewpoint. Topics include vector spaces, linear transformations, polynomials, determinants, tensor and wedge products, canonical forms, inner product spaces, and bilinear forms. Emphasis is on understanding the theory of linear algebra; homework and exams include at least as many proofs as computational problems. For a less theoretical course that covers approximately the same subject matter, see MATH 4310.

MATH 4340 Honors Introduction to Algebra (MQR)

Spring, 4 credits. Prerequisite: MATH 4330 or permission of instructor. *Students may not receive credit for both MATH 4320 and MATH 4340.*

Honors version of a course in abstract algebra, which treats the subject from an abstract and axiomatic viewpoint, including universal mapping properties. Topics include groups, groups acting on sets, Sylow theorems; rings, factorization: Euclidean rings, principal ideal domains and unique factorization domains, the structure of finitely generated modules over a principal ideal domain, fields, and Galois theory. The course emphasizes understanding the theory with proofs in both homework and exams. An optional computational component using the computer language GAP is available. For a less theoretical course that covers similar subject matter, see MATH 4320.

MATH 4370 Computational Algebra (MQR)

Spring, 4 credits. Prerequisite: linear algebra (MATH 2940, or MATH 2210, or MATH 4310).

Introduction to Gröbner bases theory, which is the foundation of many algorithms in computational algebra. In this course, students learn how to compute a Gröbner basis for polynomials in many variables. Covers the following applications: solving systems of polynomial equations in many variables, solving diophantine equations in many variables, 3-colorable graphs, and integer programming. Such applications arise, for example, in computer science, engineering, economics, and physics.

MATH 4410 Introduction to Combinatorics I (MQR)

Fall, 4 credits. Prerequisite: MATH 2210, 2230, 2310, or 2940.

Combinatorics is the study of discrete structures that arise in a variety of areas, particularly in other areas of mathematics, computer science, and many areas of application. Central concerns are often to count objects having a particular property (e.g., trees) or to prove that certain structures exist (e.g., matchings of all vertices in a graph). The first semester of this sequence covers basic questions in graph theory, including extremal graph theory (how large must a graph be before one is guaranteed to have a certain subgraph) and Ramsey theory (which shows that large objects are forced to have structure). Variations on matching theory are discussed, including theorems of Dilworth, Hall, König, and Birkhoff, and an introduction to network flow theory. Methods of enumeration (inclusion/exclusion, Möbius inversion, and generating functions) are introduced and applied to the problems of counting permutations, partitions, and triangulations.

MATH 4420 Introduction to Combinatorics II (MQR)

Spring. 4 credits. Prerequisite: MATH 2210, 2230, 2310, or 2940.

Continuation of MATH 4410, although formally independent of the material covered there. The emphasis here is the study of certain combinatorial structures, such as Latin squares and combinatorial designs (which are of use in statistical experimental design), classical finite geometries and combinatorial geometries (also known as matroids, which arise in many areas from algebra and geometry through discrete optimization theory). There is an introduction to partially ordered sets and lattices, including general Möbius inversion and its application, as well as the Polya theory of counting in the presence of symmetries.

[MATH 4500 Matrix Groups (MQR)

Fall. 4 credits. Prerequisite: MATH 2210–2220, 2230–2240, or 1920 and 2940. Next offered 2010–2011.

Topics include Lie algebras (which are an extension of the notion of vector multiplication in three-dimensional space), the exponential mapping (a generalization of the exponential function of calculus), and representation theory (which studies the different ways in which groups can be represented by matrices.)

MATH 4510 Euclidean and Spherical Geometry (MQR)

Fall. 4 credits. Prerequisite: MATH 2210, 2230, 2310, or 2940, or permission of instructor.

Covers topics from Euclidean and spherical (non-Euclidean) geometry. Nonlecture, seminar-style course organized around student participation.

MATH 4520 Classical Geometries (MQR)

Spring. 4 credits. Prerequisite: MATH 2210, 2230, 2310, or 2940, or permission of instructor.

Introduction to hyperbolic and projective geometry—the classical geometries that developed as Euclidean geometry was better understood. For example, the historical problem of the independence of Euclid's fifth postulate is understood when the existence of the hyperbolic plane is realized. Straightedge (and compass) constructions and stereographic projection in Euclidean geometry can be understood within the structure of projective geometry. Topics in hyperbolic geometry include models of the

hyperbolic plane and relations to spherical geometry. Topics in projective geometry include homogeneous coordinates and the classical theorems about conics and configurations of points and lines. Optional topics include principles of perspective drawing, finite projective planes, orthogonal Latin squares, and the cross ratio.

MATH 4530 Introduction to Topology (MQR)

Fall. 4 credits. Prerequisite: MATH 2210, 2230, 2310, or 2940, plus at least one mathematics course numbered 3000 or above, or permission of instructor.

Topology may be described briefly as qualitative geometry. This course begins with basic point-set topology, including connectedness, compactness, and metric spaces. Later topics may include the classification of surfaces (such as the Klein bottle and Möbius band), elementary knot theory, or the fundamental group and covering spaces.

MATH 4540 Introduction to Differential Geometry (MQR)

Spring. 4 credits. Prerequisites: MATH 2210–2220, 2230–2240, or 2930–2940, plus at least one mathematics course numbered 3000 or above. MATH 4530 is not a prerequisite.

Differential geometry involves using calculus to study geometric concepts such as curvature and geodesics. This introductory course focuses on the differential geometry of curves and surfaces. It may also touch upon the higher-dimensional generalizations, Riemannian manifolds, which underlie the study of general relativity.

[MATH 4550 Applicable Geometry (MQR)

Spring. 4 credits. Prerequisite: good introduction to linear algebra (e.g., MATH 2210, 2230, 2310, or 2940) or permission of instructor. Does not assume students know the meaning of all words in the following description. Next offered 2010–2011.

Introduction to the theory of n -dimensional convex polytopes and polyhedra and some of its applications, with an in-depth treatment of the case of three dimensions.]

MATH 4710 Basic Probability (MQR)

Fall. 4 credits. Prerequisites: one year of calculus. Recommended: some knowledge of multivariate calculus. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 4710, ECON 3190, BTRY 4080.*

Introduction to probability theory, which prepares the student to take MATH 4720. The course begins with basics: combinatorial probability, mean and variance, independence, conditional probability, and Bayes formula. Density and distribution functions and their properties are introduced. The law of large numbers and the central limit theorem are stated and their implications for statistics are discussed.

MATH 4720 Statistics (MQR)

Spring. 4 credits. Prerequisites: MATH 4710 and knowledge of linear algebra (e.g., MATH 2210). Recommended: some knowledge of multivariable calculus. *Due to an overlap in content, students will receive credit for only one course in the following group: MATH 4720, ECON 3190, BTRY 4090.*

Statistics have proved to be an important research tool in nearly all of the physical,

biological, and social sciences. This course serves as an introduction to statistics for students who already have some background in calculus, linear algebra, and probability theory. Topics include parameter estimation, hypothesis testing, and linear regression. The course emphasizes both the mathematical theory of statistics and techniques for data analysis that are useful in solving scientific problems.

MATH 4740 Stochastic Processes (MQR)

Spring. 4 credits. Prerequisites: MATH 4710, BTRY 4080, ORIE 3600, or ECON 3190 and some knowledge of matrices (multiplication and inverses).

A one-semester introduction to stochastic processes which develops the theory together with applications. The course will always cover Markov chains in discrete and continuous time and Poisson processes. Depending upon the interests of the instructor and the students, other topics may include queueing theory, martingales, Brownian motion, and option pricing. This course may be useful to graduate students in the biological sciences or other disciplines who encounter stochastic models in their work but who do not have the background for more advanced courses such as ORIE 6500.

[MATH 4810 Mathematical Logic (also PHIL 4310) (MQR)

Spring. 4 credits. Prerequisites: MATH 2220 or 2230 and preferably some additional course involving proofs in mathematics, computer science, or philosophy. Next offered 2010–2011.

First course in mathematical logic: formal definitions of languages, truth, proofs and computability. Completeness, incompleteness and compactness theorems.]

MATH 4820 Topics in Logic (also PHIL 4311) (MQR)

Spring. 4 credits.

For description, see PHIL 4311.

MATH 4860 Applied Logic (also CS 4860) (MQR)

Fall. 4 credits. Prerequisites: MATH 2210–2220, 2230–2240, or 1920 and 2940; CS 2800 or equivalent (e.g., MATH 3320, 3360, 4320, 4340, or 4810); and additional course in mathematics or theoretical computer science.

Covers propositional and predicate logic; compactness and completeness by tableaux, natural deduction, and resolution. Other possible topics include equational logic; Herbrand Universes and unification; rewrite rules and equational logic, Knuth-Bendix method and the congruence-closure algorithm and lambda-calculus reduction strategies; topics in Prolog, LISP, ML, or Nuprl; and applications to expert systems and program verification.

MATH 4900 Supervised Reading and Research

Fall, spring. 1–6 credits.

Supervised reading and research by arrangement with individual professors. Not for material currently available in regularly scheduled courses.

Professional-Level and Mathematics Education Courses

MATH 5080 Mathematics for Secondary School Teachers

Fall, spring. 1–6 credits. Prerequisite: secondary school mathematics teachers or permission of instructor.

Examination of the principles underlying the content of the secondary school mathematics curriculum, including connections with the history of mathematics and current mathematics research.

Graduate Courses

Many of our graduate courses are topics for which descriptions are not included here; however, during each pre-enrollment period a schedule of graduate courses to be offered the following semester is posted at www.math.cornell.edu under "Courses." This web site includes course descriptions that are often more detailed than those included here, as well as a means for interested students to participate in the process of scheduling meeting times.

MATH 6110 Real Analysis

Fall. 4 credits.
MATH 6110–6120 are the core analysis courses in the mathematics graduate program. 6110 covers measure and integration and functional analysis.

MATH 6120 Complex Analysis

Spring. 4 credits.
MATH 6110–6120 are the core analysis courses in the mathematics graduate program. 6120 covers complex analysis, Fourier analysis, and distribution theory.

MATH [6130]–6140 Topics in Analysis

6130, fall; 6140, spring. 4 credits each. 6130 next offered 2010–2011.

MATH 6170 Dynamical Systems

Fall. 4 credits. Generally offered every two years.
Topics include existence and uniqueness theorems for ODEs; Poincaré-Bendixon theorem and global properties of two dimensional flows; limit sets, nonwandering sets, chain recurrence, pseudo-orbits and structural stability; linearization at equilibrium points: stable manifold theorem and the Hartman-Grobman theorem; and generic properties: transversality theorem and the Kupka-Smale theorem. Examples include expanding maps and Anosov diffeomorphisms; hyperbolicity: the horseshoe and the Birkhoff-Smale theorem on transversal homoclinic orbits; rotation numbers; Herman's theorem; and characterization of structurally stable systems.

[MATH 6180 Smooth Ergodic Theory

4 credits. Next offered 2010–2011.
Topics include invariant measures; entropy; Hausdorff dimension and related concepts; hyperbolic invariant sets: stable manifolds, Markov partitions and symbolic dynamics; equilibrium measures of hyperbolic attractors; ergodic theorems; Pesin theory: stable manifolds of nonhyperbolic systems; Liapunov exponents; and relations between entropy, exponents, and dimensions.]

MATH 6190–6200 Partial Differential Equations

6190, fall; 6200, spring. 4 credits each semester.
Covers basic theory of partial differential equations.

MATH 6210 Measure Theory and Lebesgue Integration

Fall. 4 credits.
Covers measure theory, integration, and L_p spaces.

MATH 6220 Applied Functional Analysis

Spring. 4 credits.
Covers basic theory of Hilbert and Banach spaces and operations on them. Applications.

[MATH 6280 Complex Dynamical Systems

4 credits. Prerequisite: MATH 4180. Next offered 2010–2011.
This course covers various topics in the dynamics of analytic mappings in one complex variable, including Julia sets, the Mandelbrot set, and selected additional topics.]

MATH 6310 Algebra

Fall. 4 credits. Assumes familiarity with material of standard undergraduate course in abstract algebra.
MATH 6310–6320 are the core algebra courses in the mathematics graduate program. 6310 covers group theory, especially finite groups; rings and modules; ideal theory in commutative rings; arithmetic and factorization in principal ideal domains and unique factorization domains; introduction to field theory; tensor products and multilinear algebra. (Optional topic: introduction to affine algebraic geometry.)

MATH 6320 Algebra

Spring. 4 credits. Prerequisite: MATH 6310.
MATH 6310–6320 are the core algebra courses in the mathematics graduate program. 6320 covers Galois theory, representation theory of finite groups, introduction to homological algebra. Familiarity with the material of a standard undergraduate course in abstract algebra will be assumed.

MATH 6330 Noncommutative Algebra

Fall 4 credits.
Covers Wedderburn structure theorem, Brauer group, and group cohomology.

MATH 6340 Commutative Algebra

Spring. 4 credits.
Covers Dedekind domains, primary decomposition, Hilbert basis theorem, and local rings.

[MATH 6490 Lie Algebras

Spring. 4 credits. Next offered 2010–2011.
Topics include nilpotent, solvable and reductive Lie algebras; enveloping algebras; root systems; Coxeter groups; and classification of simple algebras.]

MATH 6500 Lie Groups

Spring. 4 credits.
Topics include topological groups, Lie groups; relation between Lie groups and Lie algebras; exponential map, homogeneous manifolds; and invariant differential operators.

MATH 6510 Algebraic Topology

Spring. 4 credits.
One of the core topology courses in the mathematics graduate program. An introductory study of certain geometric processes for associating algebraic objects such as groups to topological spaces. The most important of these are homology groups and homotopy groups, especially the first homotopy group or fundamental group, with the related notions of covering spaces and group actions. The development of homology theory focuses on verification of the Eilenberg-Steenrod axioms and on effective methods of calculation such as simplicial and cellular homology and Mayer-Vietoris sequences. If time permits, the cohomology ring of a space may be introduced.

MATH 6520 Differentiable Manifolds I

Fall. 4 credits. Prerequisites: advanced calculus, linear algebra (MATH 4310), point-set topology (MATH 4530).
One of the core topology courses in the mathematics graduate program. Introduction to geometry and topology from a differentiable viewpoint, suitable for beginning graduate students. The objects of study are manifolds and differentiable maps. The collection of all tangent vectors to a manifold forms the tangent bundle, and a section of the tangent bundle is a vector field. Alternatively, vector fields can be viewed as first-order differential operators. Students study flows of vector fields and prove the Frobenius integrability theorem. In the presence of a Riemannian metric, the notions of parallel transport, curvature, and geodesics are development. Students examine the tensor calculus and the exterior differential calculus and prove Stokes' theorem. If time permits, de Rham cohomology, Morse theory, or other optional topics are introduced.

[MATH 6530 Differentiable Manifolds II

Spring. Prerequisites: MATH 6520 or equivalent. Next offered 2010–2011.
Advanced topics from differential geometry and differential topology selected by instructor. Examples of eligible topics include transversality, cobordism, Morse theory, classification of vector bundles and principal bundles, characteristic classes, microlocal analysis, conformal geometry, geometric analysis and partial differential equations, and Atiyah-Singer index theorem.]

[MATH 6610 Geometric Topology

Fall. 4 credits. Next offered 2010–2011.
Introduction to some of the more geometric aspects of topology and its connections with group theory. Possible topics include surface theory, 3-manifolds, knot theory, geometric and combinatorial group theory, hyperbolic groups, and hyperbolic manifolds.]

MATH 6620 Riemannian Geometry

Spring. 4 credits.
Topics include linear connections, Riemannian metrics and parallel translation; covariant differentiation and curvature tensors; the exponential map, the Gauss Lemma and completeness of the metric; isometries and space forms, Jacobi fields and the theorem of Cartan-Hadamard; the first and second variation formulas; the index form of Morse and the theorem of Bonnet-Myers; the Rauch, Hessian, and Laplacian comparison theorems; the Morse index theorem; the conjugate and cut loci; and submanifolds and the Second Fundamental form.

MATH 6710 Probability Theory I

Fall. 4 credits. Prerequisite: knowledge of Lebesgue integration theory, at least on real line. (Students can learn this material by taking parts of MATH 4130–4140 or 6210.)
A mathematically rigorous course in probability theory which uses measure theory but begins with the basic definitions of independence and expected value in that context. Law of large numbers, Poisson and central limit theorems, and random walks.

MATH 6720 Probability Theory II

Spring. 4 credits. Prerequisite: MATH 6710.
Conditional expectation, martingales, Brownian motion. Other topics such as Markov chains, ergodic theory, and stochastic calculus depending on time and interests of the instructor.

MATH 6740 Introduction to Mathematical Statistics

Spring, 4 credits. Prerequisites: MATH 6710 (measure theoretic probability) and ORIE 6700, or permission of instructor.

Topics include an introduction to the theory of point estimation, hypothesis testing and confidence intervals, consistency, efficiency, and the method of maximum likelihood. Basic concepts of decision theory are discussed; the key role of the sufficiency principle is highlighted and applications are given for finding Bayesian, minimax, and unbiased optimal decisions. Modern computer-intensive methods like the bootstrap receive some attention, as do simulation methods involving Markov chains. The parallel development of some concepts of machine learning is exemplified by classification algorithms. An optional section may include nonparametric curve estimation and elements of large sample asymptotics.

MATH 6810 Logic

Spring, 4 credits.

Covers basic topics in mathematical logic, including propositional and predicate calculus; formal number theory and recursive functions; completeness and incompleteness theorems, compactness and Skolem-Loewenheim theorems. Other topics as time permits.

MATH [7110]-7120 Seminar in Analysis

7110, fall; 7120, spring, 4 credits. 7110 next offered 2010-2011.

MATH 7130 Functional Analysis

Spring, 4 credits.

Covers topological vector spaces, Banach and Hilbert spaces, and Banach algebras. Additional topics selected by instructor.

[MATH 7150 Fourier Analysis

Spring, 4 credits. Next offered 2010-2011.]

MATH 7170 Applied Dynamical Systems (also TAM 7760)

Fall, 4 credits. Recommended: TAM 6750, MATH 6170, or equivalent.

Topics include review of planar (single-degree-of-freedom) systems; local and global analysis; structural stability and bifurcations in planar systems; center manifolds and normal forms; the averaging theorem and perturbation methods; Melnikov's method; discrete dynamical systems, maps and difference equations, homoclinic and heteroclinic motions, the Smale Horseshoe and other complex invariant sets; global bifurcations, strange attractors, and chaos in free and forced oscillator equations; and applications to problems in solid and fluid mechanics.

[MATH 7310-7320 Seminar in Algebra

7310, fall; 7320, spring, 4 credits each semester. Next offered 2010-2011.]

MATH 7350 Topics in Algebra

Fall, spring, 4 credits.

Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

[MATH 7370 Algebraic Number Theory

4 credits. Next offered 2010-2011.]

MATH 7390 Topics in Algebra

Fall, spring, 4 credits.

Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Content varies.

[MATH 7400 Homological Algebra

Fall, 4 credits. Next offered 2010-2011.]

MATH 7510-7520 Berstein Seminar in Topology

7510, fall; 7520, spring, 4 credits each semester.

[MATH 7530 Algebraic Topology II

Fall, 4 credits. Next offered 2010-2011.

Continuation of 6510. The standard topics most years are cohomology, cup products, Poincaré duality, and homotopy groups. Other possible topics include fiber bundles, fibrations, vector bundles, and characteristic classes. May sometimes be taught from a differential forms viewpoint.]

MATH 7550-7560 Topology and Geometric Group Theory Seminar

7550, fall; 7560, spring, 4 credits each semester.

MATH 7570-7580 Topics in Topology

7570, fall; 7580, spring, 4 credits each semester.

Selection of advanced topics from modern algebraic, differential, and geometric topology. Content varies.

MATH 7610-7620 Seminar in Geometry

7610, fall; 7620, spring, 4 credits each semester.

MATH 7670 Algebraic Geometry

Fall, spring, 4 credits.

MATH 7710-7720 Seminar in Probability and Statistics

7710, fall; 7720, spring, 4 credits each semester.

MATH 7740 Statistical Learning Theory

Fall, 4 credits. Prerequisites: basic mathematical statistics (MATH 6740 or equivalent) and measure theoretic probability (MATH 6710).

The course aims to present the developing interface between machine learning theory and statistics. Topics are classification and pattern recognition, support vector machines, neural networks, tree methods, and boosting.

[MATH 7750 Statistical Theories Applicable to Genomics

4 credits. Next offered 2010-2011.

Focuses on statistical concepts useful in genomics (e.g., microarray data analysis) that involve a large number of populations. Discusses false discovery rate (FDR) of Benjamini and Hochberg, and Storey's papers relating to pFDR. Also discusses the Empirical Bayes approach, which could "borrow the strength" from other populations.]

MATH 7770-7780 Stochastic Processes

7770, fall; 7780, spring, 4 credits each semester.

MATH 7810-7820 Seminar in Logic

7810, fall; 7820, spring, 4 credits each semester.

MATH 7830 Model Theory

Spring, 4 credits.

Introduction to model theory at the level of the books by Hodges or Chang and Keisler.

MATH 7840 Recursion Theory

Fall, 4 credits.

Covers theory of effectively computable functions; classification of recursively enumerable sets; degrees of recursive unsolvability; applications to logic; hierarchies; recursive functions of ordinals and higher type objects; generalized recursion theory.

[MATH 7870 Set Theory

Spring, 4 credits. Next offered 2010-2011. First course in axiomatic set theory at the level of the book by Kunen.]

MATH 7880 Topics in Applied Logic

Fall, 4 credits.

Covers applications of the results and methods of mathematical logic to other areas of mathematics and science. Topics vary each year; some recent examples are: automatic theorem proving, formal semantics of programming and specification languages, linear logic, constructivism (intuitionism), nonstandard analysis, automata theory, and finite model theory. This year the course will be conducted as a teaching and research seminar covering current topics in the logical foundations of computer science. Topics will include logics and model theory for hybrid systems, non-monotonic reasoning, and probabilistic reasoning.

MATH 7900 Supervised Reading and Research

Fall, spring, 1-6 credits.

MEDIEVAL STUDIES

A. S. Galloway, director; F. M. Ahl, K. Bowes, R. Brann, C. Brittain, E. W. Browne, O. Falk, A. B. Groos, K. Haines-Eitzen, W. E. Harbert, T. D. Hill, T. J. Hinrichs, C. Howie, P. R. Hyams, W. J. Kennedy, S. MacDonald, S. Manning, M. Migiel, J. M. Najemy, J. A. Peraino, S. Pinet, D. S. Powers, M. Raskolnikov, E. Rebillard, C. Robinson, C. Ruff, W. Sayers, S. Senderovich, S. M. Toorawa, D. X. Warner, M. L. Weiss, S. Zacher, Emeritus: A. M. Colby-Hall, J. J. John, C. V. Kaske, P. I. Kuniholm, W. Wetherbee.

Undergraduate Study in Medieval Studies

Undergraduate students may pursue an undergraduate minor in medieval studies, for which they must complete five courses at the 2000 level or above in at least two different disciplines, of which up to two may also count toward their major. Students should seek out an advisor, and may wish to consult with the director. Those completing a minor will receive a notification on their transcripts and a certificate signed by the director and the dean of the college; students who are completing undergraduate minors are currently eligible for the Miller Scholarship offered by the Telluride Association, funding a year at the Central European University in Budapest, Hungary.

Students derive many other benefits from pursuing such a minor, as they do from taking courses in medieval cultures, languages, and literature generally. The Medieval Studies Program houses a lively undergraduate association, Quodlibet, which arranges frequent lectures on medieval topics and an annual celebratory reading of prose and poetry in many medieval languages. Cornell's students and scholars pursuing varied interests in these many realms constitute a strong and supportive community. Course work in medieval studies enhances the student's enjoyment and understanding of the artistic and material relics of the Middle Ages: Gregorian chant, illuminated manuscripts and stained glass windows, Gothic cathedrals, Crusader castles, and picturesque towns cramped within ancient walls. The student will discover the serious realities involved in, and

shaped by, Arthurian tales of knights and ladies, dungeons, dragons, and other marvels. Students can analyze and appreciate the horrors of the Black Death, triumphs in courtly love and pitched battle, swords and scimitars, caliphs and popes, fear of demons and djinns, and angels. The period saw many of the foundational choices that have, for good and ill, made the world what it is today. Many of our current challenges in the fields of law, human rights, attitudes toward power, authority, gender relations, and sexual mores derive from the ways in which these and other questions were formulated a millennium ago. Many of the courses listed by the Medieval Studies Program pertain specifically to these fields, as well as to the interdisciplinary combinations for which the program is noted.

Medieval Languages

Medieval texts (like all others) become most lively and informative when read in the original, and Cornell fortunately offers many courses for students interested in acquiring the relevant skills: Medieval Latin, Old English, Middle English, Gothic, Old Saxon, Old High German, Middle High German, Old Norse-Icelandic, Old Irish, Middle Welsh, Old Occitan (Provençal), Old French, Medieval Spanish, Medieval Italian, Old Russian, Old Church Slavonic, Classical Arabic, Medieval Hebrew, Classical Chinese, and Classical Japanese.

Some medieval languages require study of a modern language (e.g., French for Old Occitan and Old French) or a classical language (Classical Latin for Medieval Latin) as background. Students interested in an undergraduate minor in medieval studies should begin the study of a medieval language as early as possible, so that they may be able to study texts in the original before they graduate. Students are advised to consult the sponsoring departments for information about the prerequisites for various medieval languages.

Graduate Study

The Medieval Studies Program offers both an interdisciplinary and a literary comparative Ph.D. in medieval studies. Disciplinary fields of concentration offered within the Field of medieval studies are medieval archaeology, medieval history, medieval history of art, medieval literature, medieval music, medieval philology and linguistics, and medieval philosophy. Information about the graduate program in medieval studies is available from the field coordinator (medievalst@cornell.edu), and at *Cornucopia*, the program's web site (www.arts.cornell.edu/medieval).

Medieval Studies Courses: Graduate and Undergraduate

Courses in various aspects of medieval studies are offered every year in several cooperating departments, including Art History, Asian Studies, Classics, Comparative Literature, English, German Studies, History, Linguistics, Music, Near Eastern Studies, Philosophy, Romance Studies, Russian Literature, and by the Society for the Humanities. For descriptions, please see the home department. The current year's offerings are:

- ARTH 3300 Romanesque and Early Gothic Art and Architecture**
Spring. 4 credits. C. Robinson.
- ARTH 4305 Looking for Love: Visual and Literary Cultures of Love in the Medieval Mediterranean 1100–1400 AD**
Spring. 4 credits. C. Robinson.
- CHLIT 2213–2214 Introduction to Classical Chinese**
2213, fall; 2214, spring. 3 credits each semester. D. X. Warner.
- CHLIT 4420 Tang Poetry: Themes and Contexts**
Spring. 4 credits. D. X. Warner.
- CLASS 3625 Christianization of the Roman World (also HIST/NES 3625, RELST 3635)**
Fall. 4 credits. E. Rebillard.
- CLASS 3750 Introduction to Dendrochronology (also ARKEO 3090, ARTH 3250)**
Fall. 4 credits. S. Manning.
- CLASS 7682 Topics in Ancient History (also HIST 6300, JWST/NES 6642)**
Spring. 4 credits. E. Rebillard.
- COML 4515/6515 Ariosto, Rabelais, Spenser (also ENGL/ROMS 4515/6515)**
Fall. 4 credits. W. J. Kennedy.
- ENGL 2100 Medieval Romance: Voyage to the Otherworld**
Fall. 4 credits. T. Hill.
- ENGL 2130 Cultures of the Middle Ages**
Fall. 4 credits. S. Zacher.
- ENGL 2740 Scottish Literature**
Fall. 4 credits. T. Hill and H. Shaw.
- ENGL 3080 Old Norse–Icelandic Literature in Translation**
Spring. 4 credits. T. Hill.
- ENGL 3110/6110 Old English**
Fall. 4 credits. S. Zacher.
- ENGL 3120/6120 Beowulf**
Spring. 4 credits. T. Hill.
- ENGL 3190 Chaucer**
Spring. 4 credits. M. Raskolnikov.
- ENGL 6151 Visionaries and Vision Literature in the Middle Ages**
Fall. 4 credits. A. Galloway.
- ENGL 6190 Chaucer and Gower**
Spring. 4 credits. A. Galloway.
- FREN 3280 Medieval Francophone Literature**
Fall. 4 credits. C. Howie.
- FREN 4390 Poems of Force: Medieval Epic**
Spring. 4 credits. C. Howie.
- GERST 4050–4060 Introduction to Middle High German**
4050, fall; 4060, spring. 4 credits each term. A. Groos.
- ITAL 3400 History of the Grotesque**
Fall. 4 credits. C. Howie.
- ITAL 4270/6270 Dante's Commedia**
Spring. 4 credits. M. Migiel.

- LATIN 4202 Advanced Readings in Latin Literature**
Spring. 4 credits. C. Brittain.
- LATIN 7271 Latin Graduate Seminar: Cicero's philosophical works**
Fall. 4 credits. C. Brittain.
- LING 1109 English Words: Histories and Mysteries**
Spring. 3 credits. W. Harbert.
- LING 2217 History of the English Language to 1300 (also ENGL 2170)**
Fall. 4 credits. W. Harbert.
- LING 2218 History of the English Language since 1300 (also ENGL 2180)**
Spring. 4 credits. W. Harbert.
- LING 2236 Introduction to Scottish Gaelic**
Spring. 3 credits. W. Harbert.
- LING 4417 History of the Russian Language (also RUSSA 4401)**
Spring. 4 credits. W. Browne.
- LING 6645 Gothic**
Fall. 4 credits. W. Harbert.
- [MEDVL 4103/6103 Survey of Medieval Latin Literature (also LATIN 4213/7213)]**
Fall. 4 credits. Next offered 2011–2012. This survey is designed to introduce students to characteristic genres and discourses of Medieval Latin.]
- [MEDVL 4201/6201 Topics in Medieval Latin Literature (also LATIN 4223/7223)]**
Spring. 4 credits. Next offered 2010–2011.]
- [MEDVL 6102 Latin Paleography (also LATIN 7222)]**
Spring. 4 credits. Next offered 2011–2012. Latin Paleography will be devoted to approximately equal measure to the dating, localization, and reading of scripts, and to codicological methods in the study of medieval manuscripts.]
- [MEDVL 7770 Medieval Studies Proseminar]**
Fall. 2 credits. Staff. Next offered 2010–2011. This course is designed to introduce graduate students to some of the bibliography and approaches available for studying the Middle Ages.]
- MEDVL 8010 Directed Study—Individual**
Fall and spring. 2–4 credits. Staff.
- MEDVL 8020 Directed Study—Group**
Fall and spring. 2–4 credits. Staff.
- NES 2655 Introduction to Islamic Civilization (also HIST 2540, RELST 2655)**
Fall. 3 credits. D. Powers.
- NES 2754 Introduction to Near Eastern Civilizations: The Literature of the Princes, Prophets, and Poets (also COML 2754)**
Fall. 3 credits. S. Toorawa.
- NES 3212 Quran and Commentary (also RELST 3212)**
Fall. 4 credits. D. Powers.
- NES 3677 Search for the Historical Muhammad (also HIST/RELST 3677)**
Spring. 4 credits. D. Powers.

NES 3723/6723 The Arabian Nights: Then and Now (also COML 3723/6723)

Fall. 4 credits. S. Toorawa.

NES 4639 Readings in Arabic Historical Texts (also RELST 4639)

Spring. 4 credits. D. Powers.

PHIL 4002/6020 Latin Philosophical Texts (also LATIN 7262, RELST 6020)Fall and spring. Variable credit.
S. MacDonald and C. Brittain.**PHIL 6210 Seminar in Medieval Philosophy**

Fall. 4 credits. S. MacDonald.

SHUM 4824 Medieval Translation in Motion (also DANCE 4384, ENGL 4072, FREN 4824)

Fall. 4 credits. S. Chaganti.

SHUM 4931 Vitality and Power in China (also ASIAN 4429, HIST 4931, RELST 4931, STS 4911)

Spring. 4 credits. T. J. Hinrichs.

SPAN 2170 Early Hispanic Modernities

Spring. 4 credits. S. Pinet.

SPAN 2340 Faith, Love and Adventure in Medieval Spain

Fall. 4 credits. S. Pinet.

SPAN 3540 Stages: Theater of Early Modern Spain

Spring. 4 credits. S. Pinet.

SPAN 6470 Theory of the Novel: Modernity's Subjects (1300-1600)

Fall. 4 credits. S. Pinet.

MUSIC

R. Sierra, chair; C. Johnston Turner, director of undergraduate studies (340 Lincoln Hall, 255-3712); J. Peraino, director of graduate studies (116 Lincoln Hall, 255-5059); X. Bjerken, B. Boettcher, K. Ernste, T. Feeney, A. Groos, J. Haines-Eitzen, R. Harris-Warrick, M. Hatch, H. Jancaitis, J. Kellock, C. Kim, J. Lin, M. Marsit, J. May, P. Merrill, S. Pond, A. Richards, S. Stucky, S. Tucker, J. Webster, M. Yampolsky, D. Yearsley, N. Zaslav. Emeritus: M. Bilson, J. Hsu, K. Husa, S. Monosoff, R. Palmer, D. Rosen, T. Sokol, M. Stith

Office: 255-4097

Web site: www.music.cornell.edu

Musical Performance and Concerts

Musical performance is an integral part of Cornell's cultural life and an essential part of its undergraduate academic programs in music. The department encourages music-making through its offerings in individual instruction and through musical organizations and ensembles that are directed and trained by members of the faculty. Students from all colleges and departments of the university join with music majors in all of these ensembles:

Vocal ensembles

- Chamber Singers
- Chorale
- Chorus
- Glee Club
- World Music Choir

Instrumental ensembles

- Chamber Music Ensembles
- Chamber Orchestra
- Symphony Orchestra

- Jazz Ensembles
- Jazz Combos
- Chamber Winds
- Wind Ensemble
- Wind Symphony
- Gamelan Ensemble
- Middle Eastern Music Ensemble
- World Drum and Dance Ensemble
- Steel Band
- Percussion Ensemble

Information about requirements, rehearsal hours, and conditions for academic credit can be found in the following listings for the Department of Music. Announcements of auditions are posted during registration each fall semester and, where appropriate, each spring semester as well.

The university is also home to many student-run musical organizations not affiliated with the Department of Music, including the Big Red Marching Band and Big Red Pep Band, and several a cappella groups. Information is available directly from each group.

The Department of Music and the Faculty Committee on Music sponsor more than 100 formal and informal concerts each year by Cornell's ensembles, faculty, and students and by distinguished visiting artists. The great majority of these concerts are free and open to the public. Lectures and concerts are listed at www.music.cornell.edu. Additional information is available through the events office (255-4760).

Nonmajors

In addition to its performing, instructional, and concert activities, the department offers numerous courses for nonmajors, many of which carry no prerequisites and presuppose no previous formal training in music. Consult the following course listings, and for further information consult Professor C. Johnston Turner, director of undergraduate studies (255-3712), or the department office, 101 Lincoln Hall (255-4097).

The Minor

For those non-majors across the university whose involvement with the music department forms an essential aspect of their undergraduate study, the undergraduate minor in Music gives both formal recognition and structural coherence to their musical studies. The Music minor is designed to provide for breadth by requiring involvement in each of the three principal subdisciplines (music theory, music history, and musical performance), while at the same time permitting enough flexibility that each student can emphasize the area or areas that interest him or her most.

The following courses are required to fulfill the undergraduate minor in Music:

1. One course in music theory: MUSIC 1101 for 3 credits, 1105 for 3 credits, or 2101/2103 for 5 credits. A student given Advanced Standing in place of MUSIC 2101/2103 should take a higher-numbered theory course; placement alone cannot fulfill this requirement.
2. One course in music history and culture, drawn from courses listed in *Courses of Study* as Music in History and Culture (3 credits) and those listed as Music History Courses for Majors and Qualified Non-Majors (3-4 credits).

3. Four credits in performance, drawn from those courses listed as Musical Instruction (i.e., private lessons in voice or another instrument), or Musical Organizations and Ensembles, or both. Since these are 1- and 2-credit courses, students may achieve their total of 4 credits in various ways: two semesters of 2-credit lessons, four semesters of 1-credit ensembles, or a combination of the two.
4. In addition to these 10-13 credits, an additional 8 credits of elective courses from any Music subdiscipline, including Electroacoustic Music, of which at least 3 credits must be in a classroom (not performance) course.

The Major

The major carries the study of music to an advanced level through the integration of performance, music theory, and music history. It is designed to accommodate both students who are oriented toward eventual graduate or professional work in music and those who wish to take a more general approach, often in conjunction with a major in another department.

Students contemplating a major in music should arrange for placement examinations and advising in the department as early as possible, preferably during the freshman orientation period. Information is available from the director of undergraduate studies. Prerequisites for admission to the major are completion of MUSIC 2102 and 2104, preferably by the end of the freshman year, with an overall grade of B- or better in each course. In consultation with the director of undergraduate studies, students are expected to have chosen an advisor from among the department faculty before acceptance into the major; admission to the major is decided by the faculty as a whole. Students majoring in music then design their course of study with their advisor.

Music majors must complete the Core Curriculum plus at least two electives. The electives allow students to focus in specific areas, such as composition, performance, jazz studies, vernacular music, Western art music, or Asian music. Students may, however, choose electives that reflect a more broadly based study. Those intending to pursue graduate study or professional work in music are advised to take further courses in addition to the two required electives.

The Core Curriculum consists of courses:

1. in music theory: MUSIC 3101, 3102, 3103, 3104
2. in music history: MUSIC 3201, 3202, 3211, 4211
3. in performance: four semesters of participation in a musical organization or ensemble sponsored by the department of music (MUSIC 3601 through 3634 and 4601 through 4651)

Electives: at least 8 credits from the following:

1. in music theory: courses among the theory listings above 3104
2. in music history: MUSIC 3222 through 3901, or 4301 and above.
3. in performance: MUSIC 3502 or 4501

Honors. The honors program in music is intended to provide special distinction for the department's ablest undergraduate majors.

Qualified students are invited to become candidates by the faculty in the second semester of their junior year. As soon as possible thereafter, the student forms a committee of three or more faculty members to guide and evaluate the honors work. In their senior year, candidates enroll in MUSIC 4911–4912 with the chair of the honors committee as instructor. Candidates are encouraged to formulate programs that allow them to demonstrate their musical and scholarly abilities, culminating in an honors thesis, composition, or recital, to be presented not later than April 1 of the senior year. An oral examination on the honors project will be administered by the candidate's committee not later than April 20. The level of honors conferred is based primarily on the candidate's performance in the honors program, and secondarily on the candidate's overall record in departmental courses and activities.

Computing in the Arts Undergraduate Minor

A minor in Computing in the Arts with an emphasis on music is available both to music majors and to students majoring in other subjects. For more information, please consult www.cis.cornell.edu/ComputingArts, or contact the director, Professor Graeme Bailey.

Distribution Requirement

College of Arts and Sciences students may apply either one or two music department courses toward the distribution requirement in Literature and the Arts (LA) or Cultural Analysis (CA), as noted. Neither first-year seminars nor advanced placement credit count toward this requirement.

If one music course is counted for distribution, it must carry at least 3 credits, and it may not be in musical performance (MUSIC 3501, 3502, or 4501) or in organizations and ensembles (MUSIC 3601 through 3634 and 4601 through 4651). Any two of the 2-credit courses MUSIC 3112, 3113, 3114 count as one course for this purpose.

If two music courses are counted for distribution in LA, they must total at least 6 credits, and at least one of the courses must be academic (as described in the preceding paragraph), not performance-oriented. The second "course," however, may comprise **either** up to 4 credits earned in performance (MUSIC 3501, 3502, or 4501) or up to 4 credits earned in organizations and ensembles (MUSIC 3601 through 3634 and 4601 through 4651), but not both.

Facilities

Music Library. The Sidney Cox Library of Music and Dance in Lincoln Hall has an excellent collection containing periodicals, books, scores, parts, sound and video recordings, microforms, rare materials, and electronic resources. Its depth and breadth serve the needs of a wide variety of users on the campus and its listening and video viewing facilities are open to all members of the Cornell community.

Concert Halls. The Department of Music sponsors more than 100 concerts annually. Cornell's principal concert halls are Bailey Hall Auditorium (about 1,400 seats), Sage Chapel (about 800), and Barnes Hall Auditorium (about 280).

Rehearsal Spaces and Practice Rooms.

Departmental ensembles rehearse primarily in Lincoln Hall, Barnes Hall, and Sage Chapel. Twenty-six studios in Lincoln Hall are available for individual practice by pianists, vocalists, and instrumentalists who are members of the Cornell community. Of these, seven have grand pianos, six have upright pianos, and two have percussion instruments.

For information about access to the practice rooms, see www.music.cornell.edu/performing/practice-rooms or contact the department office.

Instruments. Six concert grand pianos are available for performances in the various concert halls, plus several historical keyboard instruments, including fortepianos, harpsichords, and clavichords. Four distinctive organs are available to qualified individuals for lessons and practice. In addition, the music department owns a limited number of string, wind, and percussion instruments that may be rented by members of the department's ensembles.

Cornell Electroacoustic Music Center (CEMC).

The Cornell Electroacoustic Music Center comprises four project studios, a 14-workstation teaching lab in the Music Library, and a primary multichannel studio. Several live performance and recording rigs are also available, from hand-held to solid state. A combination of commercial and open-source software solutions service an array of student and faculty interests, including sound manipulation and sound spatialization, live performance, multimedia, intelligent music systems (adaptive and algorithmic composition), music notation, sound art and experimentation, and high-resolution recording. The center operates its own web server with space for web hosting, data backup, and remote login. CEMC's facilities are state-of-the-art and can accommodate almost any creative inclination.

Courses

Music Theory

Students contemplating the music major are strongly advised to take MUSIC 2101, 2102, 2103, and 2104 in the freshman year; in any case MUSIC 2102 and 2104 must be completed no later than the end of the sophomore year.

MUSIC 1100 Elements of Musical Notation

Fall or spring, weeks 2–5. 1 credit.

Corequisite: any 3-credit music course and permission of instructor. Staff.

This four-week course, given at the beginning of each semester, fulfills the requirement of basic pitch, rhythm, and score-reading skills needed for some introductory courses and 2000-level courses with prerequisites.

MUSIC 1101 Fundamentals of Music (LA-AS)

Spring. 3 credits. No previous training in music required. M. Hatch.

An introduction to the theory of music from around the world: the structures of melody and rhythm (pulse, meter, scales, modes, texture, timbre, harmony, form) and the influences of audiences, music technologies (including instruments), reasons, and contexts for music making on instrumental and vocal music from classical, folk, traditional, and popular music of Asia, Africa, Europe, and the Americas. Extensive listening and video examples.

MUSIC 1105 Introduction to Music Theory (LA-AS)

Fall. 3 credits. Recommended: experience in reading music; students may take MUSIC 1100 concurrently. J. Webster.

An elementary, self-contained introduction to the theory of Western tonal music. Fundamental musical techniques, theoretical concepts, and their application. Intervals, scales, triads; basic concepts of tonality and form; analysis of representative works. Coverage primarily of "classical" (concert) music, with some attention to popular music and jazz.

MUSIC 1466 Physics of Musical Sound (also PHYS 1204) (PBS)

Spring. 3 credits. K. Selby.

For description, see PHYS 1204.

MUSIC 2101 Tonal Theory I (LA-AS)

Fall. 3 credits. Prerequisites: admission by departmental diagnostic exam and concurrent enrollment in or previous credit for MUSIC 2103, or equivalent. Intended for students expecting to major in music and other qualified students. Staff.

Detailed study of the fundamental elements of modal and tonal music: rhythm, scales, intervals, triads; melodic principles and two-part counterpoint; diatonic harmony and four-part voice leading; basic formal structures. Study engages different repertoires, including Western art music as well as non-Western and popular traditions.

MUSIC 2102 Tonal Theory II (LA-AS)

Spring. 3 credits. Prerequisites: MUSIC 2101 and 2103 or equivalent; concurrent enrollment in or previous credit for MUSIC 2104. Intended for students expecting to major in music and other qualified students. A grade of B– or better in MUSIC 2102 is required for admission to music major. Staff.

Continued study of voice leading and harmonic progression, including diatonic modulation; analysis of binary and ternary forms as well as jazz, blues, and pop phrase models.

MUSIC 2103 Musicianship I

Fall. 2 credits. Pre- or corequisite: MUSIC 2101. Intended for students expecting to major in music and other qualified students. Staff.

Sight singing: diatonic melodies in treble, alto, and bass clefs. Keyboard: scales, triads, seventh chords, short diatonic chord progressions. Dictation: intervals, rhythms; short diatonic melodies; short diatonic chorale phrases. Score reading: two parts using treble, alto, and bass clefs. Musical terms: tempo markings and rhythmic terminology.

MUSIC 2104 Musicianship II

Spring. 2 credits. Pre- or corequisite: MUSIC 2102. Intended for students expecting to major in music and other qualified students. A grade of B– or better in MUSIC 2104, and failure in no individual musicianship components of the course, are required for admission to the music major. Staff.

Sight singing: longer melodies in three clefs, including diatonic modulation. Keyboard: diatonic chord progressions and sequences. Dictation: intervals, rhythms; longer melodies; chorale phrases with diatonic modulation. Score reading: three parts using treble, alto, and bass clefs. Transcriptions of pop, jazz, and other genres.

MUSIC 3101 Tonal Theory III (LA-AS)

Fall. 3 credits. Prerequisites: MUSIC 2102 and 2104 or equivalent. Corequisite: MUSIC 3103. Staff.

Continuation of diatonic and introduction to chromatic harmony; species counterpoint; composition in small forms.

MUSIC 3102 Tonal Theory IV (LA-AS)

Spring. 3 credits. Prerequisites: MUSIC 3101 and 3103 or equivalent. Corequisite: MUSIC 3104. Staff.

Study of and composition in larger forms, including sonata form; systematic study of chromatic harmony, voice-leading, and modulation; composition in chromatic style.

MUSIC 3103 Musicianship III

Fall. 2 credits. Pre- or corequisite: MUSIC 3101. Staff.

Sight singing: melodies with chromaticism in treble, alto, tenor, and bass clefs. Keyboard: diatonic modulation, chromatic chords.

Dictation: melodies with modulation; chorale phrases with secondary dominants and other chromatic chords. Score reading: four parts using treble, alto, tenor, and bass clefs. Musical terms: orchestral ranges, terms, clefs, and transpositions.

MUSIC 3104 Musicianship IV

Spring. 2 credits. Pre- or corequisite: MUSIC 3102. Staff.

Sight singing: melodies in four clefs, including modality and chromatic modulation. Keyboard: chromatic sequences, chromatic modulations, improvised modulations employing diatonic pivot chords. Dictation: intervals, rhythms, short melodies, and short, diatonic chorale phrases. Score reading: four parts, including transposing instruments. Musical terms: other terms in French, German, and Italian.

MUSIC 3111 Jazz Improvisation I

Fall. 3 credits. Prerequisite: MUSIC 2101 or permission of instructor. P. Merrill.

An introduction to fundamental jazz theory, technique, and applied skills.

[MUSIC 3112 Jazz Improvisation II]

Fall. 3 credits. Prerequisite: MUSIC 3111. Next offered 2010–2011. P. Merrill.

Continuation of jazz theory, technique, and applied skills.]

[MUSIC 3113 Jazz Improvisation III]

Spring. 3 credits. Prerequisite: MUSIC 3112. Next offered 2010–2011. P. Merrill.

Class work and assignments emphasize Coltrane and post-Coltrane harmony, advanced rhythmic development, augmented vocabulary, and an introduction to playing “free.”]

MUSIC 3115 Jazz Piano

Spring. 3 credits. Prerequisite: MUSIC 2101 or permission of instructor. Next offered 2010–2011. P. Merrill.

An introduction to jazz keyboard technique, intended primarily for jazz instrumentalists with little or no keyboard experience and pianists with little or no jazz experience.

[MUSIC 4101 Counterpoint # (LA-AS)]

Spring. 4 credits. Prerequisite: MUSIC 2101 or permission of instructor. Next offered 2010–2011. S. Stucky.]

[MUSIC 4102 Topics in Music Analysis (also MUSIC 6101) (LA-AS)]

Spring. 4 credits. Prerequisite: MUSIC 2101 or permission of instructor. Next offered 2010–2011. J. Webster.]

[MUSIC 4103 Topics in Post-Tonal Theory and Analysis (also MUSIC 7102) (LA-AS)]

Spring. 4 credits. Prerequisites: MUSIC 3102 and 3104. Next offered 2011–2012. Staff.]

[MUSIC 4111 Composition (LA-AS)]

Spring. 4 credits. Prerequisite: MUSIC 3101 or permission of instructor. Next offered 2010–2011. S. Stucky.

Principles of composition, approached through traditional forms (variation, sonata) and through the imitation of specific 20th-century styles. May be taken more than once for credit, by permission and if taught by a different instructor.]

[MUSIC 4121 Conducting (LA-AS)]

Fall. 4 credits. Prerequisite: MUSIC 3101 or equivalent. Next offered 2011–2012.

C. Johnston Turner.

Covers fundamentals of score reading, score analysis, rehearsal procedures, and conducting technique; instrumental and choral contexts.]

[MUSIC 4122 Orchestration (LA-AS)]

Spring. 4 credits. Prerequisite: MUSIC 3101 or permission of instructor. Next offered 2010–2011. R. Sierra.

Orchestration based on 19th- and 20th-century models.]

[MUSIC 4123 Jazz Arranging (LA-AS)]

Fall. 4 credits. Prerequisite: MUSIC 3111 or permission of instructor. Next offered 2011–2012. P. Merrill.

A survey of jazz arranging techniques for the big band.]

Music in History and Culture**MUSIC 1201 Hildegard to Handel # (LA-AS)**

Fall. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 1100. Next offered 2010–2011. R. Harris-Warrick.

The main trends in Western music from the beginnings of musical staff notation in the 10th century to the mid-18th century. Emphasis on the evolution of musical styles and the changing social, cultural, economic, and political conditions that gave rise to those styles. Topics include Gregorian chant, organum, Ars nova, Renaissance polyphony, the invention of opera, and the rise of instrumental music.

MUSIC 1202 Monteverdi to Minimalism # (LA-AS)

Fall. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 1100 or successful completion of another college-level music course. C. Johnston Turner.

[MUSIC 1301 Introduction to World Music I: Africa and the Americas (also LSP 1301) @ (CA-AS)]

Spring. 3 credits. No previous training in music required. Next offered 2010–2011. S. Pond.

This course centers on folk, popular, and traditional musical genres of the Western Hemisphere, particularly the African diaspora. It examines both the elements of musical styles and the features of society that influence music. Listening and writing assignments are major components of the course.]

[MUSIC 1302 Introduction to World Music II: Asia (also ASIAN 1192) @ (CA-AS)]

Spring. 3 credits. No previous training in music required. Next offered 2011–2012.

M. Hatch.

An exploration of folk, popular, and traditional musical genres from South, Southeast, and East Asia.]

[MUSIC 1311 Popular Music in America: A Historical Survey (also AMST 1311) # (LA-AS)]

Spring. 3 credits. Next offered 2010–2011. S. Pond.

This is a general introductory course addressing the broad range of styles described as popular music, as it has developed in the United States.]

MUSIC 1312 History of Rock Music (also AMST 1312) (LA-AS)

Spring. 3 credits. No previous training in music required. J. Peraino.

This course examines the development and cultural significance of rock music from its origins in blues, gospel, and Tin Pan Alley up to alternative rock and hip hop. The course concludes with the year 2000.

MUSIC 1313 A Survey of Jazz (also AMST 1313) (LA-AS)

Fall. 3 credits. No previous training in music required. S. Pond.

This course addresses jazz from two perspectives: the various sounds of jazz, as well as the historical streams—musical and cultural—that have contributed to its development. Listening and writing assignments are major components of the course.

MUSIC 1341 Gamelan in Indonesian History and Cultures (also ASIAN 2245, VISST 2744) @ (LA-AS)

Fall or spring. 3 credits. Prerequisite: permission of instructor. No previous knowledge of musical notation or performance experience necessary. C. Miller.

An introduction to Indonesia through its art. Elementary techniques of performance on the Indonesian *gamelan*; a general introduction to Indonesian history and cultures, and the sociocultural contexts for the arts there. Several short papers and one longer research report are required. Instruction by visiting Balinese musician.

MUSIC 2221 Bach and Handel # (LA-AS)

Spring. 3 credits. Prerequisite: any 3-credit music course or permission of instructor. D. Yearsley.

Both composers created oeuvres of incomparable richness and diversity. By examining in depth selected masterpieces, this course hopes to offer new perspectives on the continued relevance and vital rewards of their music, both instrumental and vocal, sacred and secular.

MUSIC 2222 Haydn and Mozart # (LA-AS)

Fall. 3 credits. Prerequisite: any 3-credit music course or permission of instructor. J. Webster.

A survey of the lives, works, and historical roles of Joseph Haydn and Wolfgang Amadeus Mozart.

[MUSIC 2223 Beethoven # (LA-AS)]

Fall. 3 credits. Prerequisite: any 3-credit music course or permission of instructor. Next offered 2011–2012. J. Webster.

A survey of Beethoven's life, works, and influence. While the primary focus is his musical style and its development, the course also covers social-cultural factors and the psychology and reception of genius.]

[MUSIC 2224 Mozart in History, History in Mozart # (HA-AS)]

Spring. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 1100 or successful completion of another college-level music course. Next offered 2010–2011. N. Zaslaw.

An exploration of the phenomenon that is Wolfgang Amadè Mozart, using historical documents to contextualize his life and works while using the extensive documentation of his life and works to learn about history.]

[MUSIC 2231 Musical Romantics # (LA-AS)]

Spring. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 1100. Next offered 2011–2012. Staff.]

[MUSIC 2241 Opera (also THETR 2730) # (LA-AS)]

Spring. 3 credits. No prerequisite. R. Harris-Warrick.

Opera has been enthralling audiences for 400 years; this course explores the multiple facets of its appeal. Using seven operas as the focus—chosen from different periods, national traditions, and styles—the class will examine the texts that have been turned into operas, the musical conventions that have guided composers (or against which they have worked), and the decisions directors make when they put operas on stage. Each work will be seen as well as heard—either in a special screening or, at least once in the semester, in a live performance.

Students who have a strong background in music may wish to also enroll in MUSIC 3901, which involves an extra class-period per week where the music is discussed in greater detail. Permission of the instructor is required.

[MUSIC 2242 The Orchestra and Its Music # (LA-AS)]

Spring. 3 credits. Prerequisite: any 3-credit music course or permission of instructor. Next offered 2010–2011. N. Zaslaw.

The music of, and the social structures supporting, large instrumental ensembles in the Western world from the 16th century to the present.]

[MUSIC 2501 Discovering Hip-Hop: Research and the Cornell Hip-Hop Collection (LA-AS)]

Fall. 3 credits. Limited to 15 students. Prerequisite: permission of instructor. S. Pond.

The course addresses research issues and methodologies through the lens of Cornell's Hip-Hop Collection, a gift of collector and author Johan Kugelbert, which is housed in Cornell Library's Division of Rare and Manuscript Collections. The collection features a significant archive on the history of hip-hop and rap music, documenting its emergence in the Bronx in the 1970s and early 1980s. It includes sound recordings, a key photographic archive, textile art, books, magazines, and more than five hundred original flyers. The course provides students opportunities to gain new insights into hip-hop culture, while also introducing them to research and curatorial methodologies and goals.

[MUSIC 3513 Music and Choreography (also DANCE 3530) (LA-AS)]

Fall. 3 credits. Attendance at dance concerts and music concerts required. A. Fogelsanger.

For description, see DANCE 3530.

[MUSIC 4511 Early Dance (also DANCE 4399)]

Fall. 1 credit; may be repeated for credit. Next offered 2010–2011. R. L. and R. M. Harris-Warrick.

Topic: Baroque Dance. Introduces students to the basic movement vocabulary of dances from Western Europe during the Baroque period.]

Music History Courses for Majors and Qualified Nonmajors**[MUSIC 2244 The Organ in Western Culture # (LA-AS)]**

Fall. 4 credits. Prerequisite: permission of instructor. Next offered 2010–2011. A. Richards and D. Yearsley.]

[MUSIC 3201 Survey of Western Music I # (LA-AS)]

Spring. 4 credits. Pre- or corequisite: MUSIC 2101/2103 or permission of instructor. J. Peraino.

A survey of Western music and its social contexts from the beginning of notation (circa 900) to 1700. Topics include sacred chant, secular song, polyphony, madrigals, early opera, and the development of independent instrumental music. The course emphasizes listening and comprehension of genres and styles, and is intended for music majors and qualified nonmajors.

[MUSIC 3202 Survey of Western Music II # (LA-AS)]

Fall. 4 credits. Pre- or corequisite: MUSIC 2102/2104 or permission of instructor. A. Richards.

A survey of Western music and its social contexts from 1700 to the present. Topics include the decline of church music, the rise of public concerts and opera, the evolution of the orchestra, and modernism in the 20th century. The course, which emphasizes listening and comprehension of genres and styles, is intended for music majors and qualified nonmajors.

[MUSIC 3211 Proseminar in Musicology (LA-AS)]

Spring. 4 credits. Prerequisite: MUSIC 3201–3202. D. Yearsley.

Introduction to methods in musicology, including historiography, criticism, approaches to vernacular and non-western musics, and gender studies.

[MUSIC 3222 Opera and Culture (also GERST/THETR 3740) # (LA-AS)]

Spring. 4 credits. Prerequisite: any 3-credit music course or proficiency in German or Italian. Next offered 2011–2012. A. Groos.]

[MUSIC 3231 Topics in Western Art Music to 1750 #]

Fall. 4 credits. Prerequisite: MUSIC 2102 or permission of instructor. Next offered 2011–2012. Staff.]

[MUSIC 3232 Topics in Western Art Music 1750–Present]

Spring. 4 credits. Prerequisite: MUSIC 2102 or permission of instructor. Next offered 2010–2011. Staff.]

[MUSIC 3242 Culture of the Renaissance II (also ARTH 3420, COML/FREN/RELST 3620, HIST 3640) # (CA-AS)]

Fall. 4 credits. Next offered 2010–2011. K. Long and W. J. Kennedy.]

[MUSIC 3245 Words and Music (also GERST 3600) # (LA-AS)]

Spring. 4 credits. A. Groos. For description, see GERST 3600.

[MUSIC 3301 Topics in Popular Music and Jazz (LA-AS)]

Fall. 4 credits. Prerequisite: MUSIC 2102/2104 or permission of instructor. Next offered 2010–2011. S. Pond.

This course addresses various topics, centering on the post–World War II years to ca. 1970. **Topic for 2008: Post–WWII Rhythm-and-Blues to Funk.** The course investigates the various sounds of black popular music in the post–World War II period, its antecedents, interactions with other popular musics, and influences on later developments, principally to the mid-1970s. The historical focus engages with R&B in terms of ethnicity, class, nationalism, racial politics, aesthetics, gender, and genre. The course is both reading and listening based, with opportunities for music-making as well. The course entails a significant writing component. It partially satisfies the Music major history requirement. Since the course addresses different topics in different years, it may be taken more than once for credit.]

[MUSIC 3901 Supplemental Study in Music History]

Fall or spring. 1 credit. Prerequisite: MUSIC 2101 or permission of instructor.

Corequisite: enrollment in an approved 1000- or 2000-level 3-credit music history course. Staff.

Intended primarily for music majors, this option allows students enrolled in an approved 1000- or 2000-level 3-credit music history course to study the material at a more advanced level through supplementary reading, discussion, and writing, by arrangement with the professor. Advanced study of various topics in music history. Students enrolling in MUSIC 3901 also register for an approved 2000-level music history course and pursue independent research and writing projects.

[MUSIC 4181 Psychology of Music (also PSYCH 4180/6180) (KCM-AS)]

Fall. 3 or 4 credits, depending on whether student elects to do an independent project. C. L. Krumhansl.

For description, see PSYCH 4180.

[MUSIC 4211 Senior Seminar]

Fall. 4 credits. Prerequisite: MUSIC 3211. N. Zaslaw.

The possibilities and limitations of the study of historical performance practices. An investigation of one controversial aspect of the performance of music from each of the traditional music-historical periods of Western music, finishing with a comparative study of historical changes in the performance of Indonesian gamelan music.

[MUSIC 4222 Music and Monstrous Imaginings # (LA-AS)]

Spring. 4 credits. Prerequisite: ability to follow a musical score. Next offered 2010–2011. A. Richards.

Explores the monstrous and fantastical in musical, literary, and visual culture around 1800. Topics include theory of Fantastic, Uncanny, Gothic, and Grotesque.]

[MUSIC 4231 Music and Queer Identity (CA-AS)]

Spring. 4 credits. Next offered 2010–2011. J. Peraino.]

[MUSIC 4232 Women and Music (CA-AS)]
Spring. 4 credits. Next offered 2011–2012.
J. Peraino.]

MUSIC 4301 Introduction to Ethnomusicology (also MUSIC 6301) @ (SBA-AS)
Spring. 4 credits. M. Hatch.
For description, see MUSIC 6301.

Electroacoustic Music Courses

MUSIC 1421 Introduction to Computer Music (LA-AS)
Fall. 3 credits. Limited enrollment.
Recommended: ability to read music.
K. Ernste.

A composition-based introduction to computer hardware and software for digital sound and digital media. Fundamentals of MIDI sequencing and other techniques for producing electroacoustic music. Each student creates several short compositions.

MUSIC 1465 Computing in the Arts (also CS/CIS/ENGRI 1610, FILM 1750, PSYCH 1650) (LA-AS)
Fall. 3 credits. G. Bailey.
For description, see CS 1610.

[MUSIC 2421 Computers in Music Performance (LA-AS)]
Spring. 3 credits. Limited enrollment. Next offered 2010–2011. K. Ernste.
A course in live performance and real-time, interactive sound manipulation techniques].

[MUSIC 3421 Scoring the Moving Image (LA-AS)]
Spring. 4 credits. Limited enrollment. Next offered 2011–2012. K. Ernste.
A course in composing music for multimedia: film, animation, theater, dance, art, design, and/or games. MUSIC 3421 is appropriate as a continuation for those who have taken MUSIC 1421 or 2421, but is open to others by permission.]

MUSIC 3431 Sound Design and Digital Audio (also DANCE/THETR 3680) (LA-AS)
Fall and spring. 3 credits. W. Cross.
For description, see THETR 3680.

[MUSIC 3441 Interactive Performance Technology (also DANCE 3560, THETR 3690) (LA-AS)]
Fall. 4 credits. Next offered 2010–2011.
W. Cross and A. Fogelsanger.
For description, see THETR 3690.]

Independent Study and Honors

MUSIC 4901 Independent Study in Music
Fall or spring. 1–6 credits. Prerequisite: departmental approval; experience in proposed area of study. Staff.
Independent study affords students the opportunity to pursue special interests or research not treated in regularly scheduled courses. A faculty member, who becomes the student's instructor for the independent course, must approve the proposed study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study; forms are available in the Office of Undergraduate Admissions and Advising, 55 and 172 Goldwin Smith Hall.

MUSIC 4911–4912 Honors in Music
Fall and spring. 8 credits per year.
Prerequisite: senior honors candidates.
Staff.

See "Honors" under "The Major" at the beginning of the MUSIC listings.

Musical Instruction

Cornell faculty members offer individual instruction in voice, organ, harpsichord, piano and fortepiano, violin, viola, cello, percussion, and some brass and woodwind instruments to those students advanced enough to do college-level work in these instruments. Lessons are available by audition only. They may be taken either without credit (MUSIC 3501) or with credit (MUSIC 3502 or 4501). All students studying with Cornell faculty members must enroll in MUSIC 3501, 3502, or 4501. Instruments may sometimes be studied for noncredit or credit outside Cornell, but also by audition only (see MUSIC 3501–4501, Secs 8, 9, and 10). For more information, please go to www.music.cornell.edu.

Lessons for beginners. The Department of Music does not offer lessons for beginners, but can recommend teachers outside Cornell for those who wish to begin studying voice or an instrument.

Auditions. Auditions are held at the beginning of each semester for lessons for advanced students. Contact the music department office in 101 Lincoln Hall for information.

Earning academic credit for lessons. For every 4 credits earned in MUSIC 3502, the student must have earned, or currently be earning, at least 3 credits in another music course (excluding MUSIC 3502, 4501, 3601–3611, or 4601–4631). These 3 credits must be earned before, or simultaneously with, the first 2 credits in 3502; they cannot be applied retroactively. Only music courses taught at Cornell (or approved transfer courses from other colleges or universities) may be used to satisfy this requirement.

Fees. For information about the fee structure for lessons, see the department's web site or contact the music department office. All fees are nonrefundable once lessons begin, even if the course is subsequently dropped.

Lessons taken outside Cornell. Under certain conditions, advanced students may earn credit for lessons taken outside Cornell. An audition is required, and no credit can be granted for beginning instruction. For further information, read the description of MUSIC 3501, 3502, and 4501, Secs 8, 9, and 10, and contact the Music Department office.

Scholarships. Music majors receive a scholarship of up to the department's full lesson fee per semester. All scholarships are intended only for lessons in the student's primary performing medium. Scholarship/registration forms, available in the music department office, are to be returned to the office within the first three weeks of classes.

MUSIC 3501, 3502, and 4501 Individual Instruction

Prerequisite: advanced students only; may register after successful audition with instructor, or, if student needs to study outside Cornell, with appropriate faculty sponsor. Students should contact instructor or music department office for audition information. Students may register for these courses in successive semesters or years.

MUSIC 3501

Fall or spring. 0 credits each semester. See section listing below for instructors.

Students who pass a successful audition to study with Cornell faculty, but either wish to take only a half-hour lesson per week or cannot receive credit for lessons, must enroll in MUSIC 3501. S–U grades only.

MUSIC 3502

Fall or spring. 2 credits each semester. See section listing below for instructors. Students earn 2 credits each semester for a one-hour lesson (or two half-hour lessons) per week, accompanied by an appropriate practice schedule. Credit may be earned only in conjunction with academic music courses; see "Earning Academic Credit for Lessons," above. Letter grades only.

MUSIC 4501

Fall or spring. 4 credits each semester. See section listing below for instructors. Open only to undergraduates majoring in music and graduate students in music.

The section numbers listed below apply to MUSIC 3501, 3502, or 4501, depending on the instrument studied.

Sec 01 Voice. J. Kellock.*

Sec 02 Organ. A. Richards and D. Yearsley.

Sec 03 Piano. X. Bjerken and Staff.

Sec 04 Harpsichord. A. Richards and D. Yearsley.

Sec 05 Violin or Viola. J. Lin.

Sec 06 Cello. J. Haines-Eitzen.

Sec 07 Percussion. T. Feeney.

Sec 08, 09, and 10 Individual Instruction Outside Cornell.

All the standard orchestral and band instruments, keyboard instruments, guitar, and voice may, under certain conditions, be studied for credit with outside teachers. This course is available primarily for the study of instruments not taught at Cornell and when there is limited enrollment in MUSIC 3501 and 3502. Prior approval and audition by a member of the faculty in the department are required, and credit may be earned only as described under "Earning academic credit for lessons," above. Additionally, a departmental petition must be completed by the end of the third week of classes. For information and a list of approved teachers, consult the department office, 101 Lincoln Hall.

* Students taking voice lessons for credit are required to attend Prof. Kellock's weekly studio class.

Musical Organizations and Ensembles

Students may participate in musical organizations and ensembles throughout the year. Permission of the instructor is required, and admission is by audition only (usually at the beginning of each semester), except that the World Music Choir and the Cornell Gamelan Ensemble are open to all students without prior audition. Registration is permitted in two of these courses simultaneously and students may register in successive years, but no student may earn more than 8 credits in these courses. Membership in these musical organizations and ensembles is also open to qualified students who wish to participate without earning credit. In that case, students should register for 0 credits with a pass/fail grade option.

MUSIC 3602 Chorus

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: successful audition. Fall: staff; spring: S. Tucker.

A treble-voice chorus specializing in music for women's voices and in mixed-voice repertory.

MUSIC 3603 Glee Club

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: successful audition. Fall: staff; spring: S. Tucker.

A male-voice chorus specializing in music for men's voices and in mixed-voice repertory.

MUSIC 3604 Chorale

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: successful audition.

H. Jancaitis.

Study and performance of selected choral music for mixed voices.

MUSIC 3610 Gamelan Ensemble

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: permission of instructor.

C. Miller.

Advanced performance on the Indonesian *gamelan*. Tape recordings of *gamelan* and elementary number notation are provided. Some instruction by visiting Balinese artist.

MUSIC 3611 World Music Choir

Spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: permission of instructor. Fall: staff; spring: S. Tucker.

A mixed-voice chorus whose repertoire is drawn from Africa, Central America, South America, the Caribbean, Eastern Europe, and Asia. Music reading skills are not necessary, but a good ear is essential.

MUSIC 3612 World Drum and Dance Ensemble

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: permission of instructor.

T. Feeney.

WDDE focuses in 2009–10 on traditional music and dance of the Anlo-Ewe culture of southern Ghana. WDDE rehearses weekly for performance as ready throughout the semester. No prior experience is necessary, and all members of the group will sing, drum, and dance.

MUSIC 3613 Cornell Steel Bands

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: audition with instructor.

T. Feeney.

The Cornell Steel Bands perform traditional music from Trinidad for steel pans, including calypso and soca, as well as repertoire expanding the boundaries of the instruments. The group includes the standard steel pan orchestra, as well as an "engine room" consisting of drumset, congas, irons (brake drums), and other percussion instruments.

One or more sections will form in 2009–10, dependent on demand and ability. The groups rehearse weekly, and perform as ready throughout the semester. Prior musical experience is necessary, though not limited to percussion, and participants must audition.

MUSIC 3614 Middle Eastern Music Ensemble (also NES 3914)

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: permission of instructor.

G. Holst-Warhaft.

Performance of diverse musical traditions from the Middle East. Instruction in individual instruments (oud, ney, kanoun, and percussion) and group rehearsals, culminating in one or two performances per semester. Songs are taught in several languages, with the assistance of local language and diction teachers.

MUSIC 3615 Jazz Ensemble II

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: successful audition. P. Merrill.

Study and performance of classic and contemporary big band literature. Rehearsal once a week with one to two performances a semester.

MUSIC 3621 Symphony Orchestra

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: successful audition. C. Kim.

Study and performance of a broad repertoire of orchestral works from Beethoven to the present.

MUSIC 3631 Wind Symphony

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: successful audition. M. Marsit.

MUSIC 3632 Music Leadership and Service

Fall and spring. 4 credits per year.

Corequisite: membership in Wind Ensemble. C. Johnston Turner.

The goal of this music performance and service learning course is to provide the opportunity in which learning experiences address human and community needs, and to allow the necessary time for reflection on those experiences. The focus of the course is on musical and personal leadership within communities—from the local to the foreign and from the known to the unknown. Communities in this context are defined by the community of students and musicians within the wind ensemble, the local communities in Ithaca and other New York state schools, and school, conservatory, and municipal communities in Costa Rica.

MUSIC 3633 Wind Ensemble

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: successful audition; previous background in percussion. C. Johnston Turner.

MUSIC 3634 Percussion Ensemble

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: audition with instructor.

Corequisite: enrollment in a Cornell large ensemble (orchestras, wind ensemble/symphony, jazz bands, or choral group). Previous background in percussion is required. T. Feeney.

The Percussion Ensemble performs pieces from the growing percussion repertory, exploring the breadth and depth of its possibilities for percussionists. Concerts might involve collaborations with composers and other instrumentalists, improvisation, or student-initiated ideas for performance.

MUSIC 4601 Chamber Singers

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: successful audition.

H. Jancaitis.

A mixed-voice chamber choir specializing in Renaissance and 20th-century music.

MUSIC 4615 Jazz Ensemble I

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: successful audition. P. Merrill.

Study and performance of classic and contemporary big band literature. Rehearsals twice a week with two to four performances per semester.

MUSIC 4616 Jazz Combos

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: successful audition. P. Merrill.

Study and performance of classic and contemporary small-group jazz.

MUSIC 4621 Chamber Orchestra

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: successful audition. C. Kim.

Study and performance of chamber orchestra works from the baroque period to the present.

MUSIC 4631 Chamber Winds

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Corequisites: enrollment in a Cornell large ensemble (orchestra, wind ensemble/symphony, jazz band, or choral group),

and permission of instructor. Coordinator: C. Johnston Turner.

Flexible instrumentation ensembles perform original woodwind, brass, and percussion music. The ensembles participate in Wind Symphony and Wind Ensemble concerts in addition to several chamber concerts throughout the year.

MUSIC 4641 Instruction in Gamelan Instruments

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester. Limited enrollment. Prerequisite: permission of instructor. C. Miller.

Concentrated instruction for students in advanced techniques of performance on Indonesian *gamelan* instruments.

MUSIC 4651 Chamber Music Ensembles

Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester.

Prerequisite: successful audition.

Coordinator: M. Yampolsky.

Study and performance of chamber music works from duos to octets, for pianists, string, and wind players.

Graduate Courses

Open to qualified undergraduates by permission of instructor.

[MUSIC 6101 Analytical Technique (also MUSIC 4102)]

Spring. 4 credits. Next offered 2010–2011. J. Webster.]

MUSIC 6201 Introduction to Bibliography and Research

Fall. 4 credits. B. Boettcher.

This course explores the nature of the discipline and introduces the many types of bibliographic tools, both printed and electronic, needed to pursue research in music.

MUSIC 6301 Introduction to Ethnomusicology

Spring. 4 credits. M. Hatch.

This course introduces the terminology for and approaches to describing and analyzing the varieties of music in the cultures of the world. First, a survey of the repertoires of music that ethnomusicologists have recorded and written about and the methods that they have used. Then, tailored to the interests of each student in the class, a more systematic consideration of the music in one or another region or culture in the world.

MUSIC 6420 Techniques for Computer Music

Fall. 4 credits. Prerequisite: permission of instructor. K. Ernste.

A course on composing electroacoustic music with an emphasis on real-time performance, historical models, and aesthetics. Other topics dependent on students' backgrounds and interests.

[MUSIC 6421 Electroacoustic Composition]

Spring. 4 credits. Next offered 2010-2011. K. Ernste.

Intended principally for doctoral students in music composition but open to others by permission. Depending on students' backgrounds and interests, the course may include an introduction to electroacoustic composing, an emphasis on aesthetic issues associated with the field, interactivity and real-time performance, software instrument design, performance controllers, or other topics.]

[MUSIC 7101 Topics in Tonal Theory and Analysis]

Spring. 4 credits. Next offered 2011-2012. J. Webster.

Topic: Sonata—form theory.]

[MUSIC 7102 Topics in Post-Tonal Theory and Analysis (also MUSIC 4103)]

Spring. 4 credits. Next offered 2011-2012. Staff.]

MUSIC 7111 Composition

Fall and spring. 4 credits each semester. R. Sierra and S. Stucky.

[MUSIC 7121 Advanced Orchestral Technique]

Fall. 4 credits. Next offered 2011-2012. S. Stucky.

Intensive analysis of orchestral scores from the past hundred years, with an emphasis on modern instrumental techniques, gestures, and textures.]

[MUSIC 7201 Seminar in Medieval Music]

Fall. 4 credits. Next offered 2010-2011. J. Perraino.

Topic: The Music of the Troubadours and Trouvères. This course will familiarize the students with this extensive repertory of secular love songs, introducing the many genres, distinct notation, and issues of melodic and textual analysis, and performance practice issues].

[MUSIC 7202 Seminar in Renaissance Music]

Spring. 4 credits. Next offered 2010-2011. R. Harris-Warrick.]

MUSIC 7203 Seminar in Baroque Music

Spring. 4 credits. R. Harris-Warrick.

Topic: The operas of Jean-Philippe Rameau. This seminar investigates the multiple components (musical, textual, choreographic, scenographic) from which Rameau's operas

were constructed, as well as the aesthetic controversies that surrounded them.

[MUSIC 7204 Seminar in Classical Music]

Fall. 4 credits. Next offered 2010-2011. N. Zaslav.]

MUSIC 7205 Seminar in Music of the Romantic Era

Spring. 4 credits. J. Webster.

Topic: Instrumental music in the larger forms.

MUSIC 7206 Seminar in Music of the 20th Century

Spring. 4 credits. S. Stucky.

Topic: Lutoslawski.

MUSIC 7211 Seminar in Performance Practice

Fall. 4 credits. N. Zaslav.

Topic: The music of Mozart and his contemporaries.

[MUSIC 7221 Mozart: His Life, Works, and Times]

Fall. 4 credits. Next offered 2011-2012. N. Zaslav.]

MUSIC 7223 Operatic States: Imagining Community in Music-Drama (also GERST 6420)

Fall. 4 credits. A. Groos.

This seminar will explore how states and communities are represented in opera from the 18th century to the end of World War II. Discussions will begin with representations of the absolutist state in baroque opera, examining its preoccupation with paradigms of good and bad rulership before turning to attempts in operas such as *Die Zauberflöte* and *Fidelio* to imagine implications of the absolutist legacy for civil society and the emerging bureaucratic state. Other sessions will be devoted to 19th-century opera, focusing on responses to the French Revolution and the changing role of the masses and "the people," before turning to the years immediately before and during World War II, ranging from the Zeitoper of the 1920s to alternative musical universes (Strauss) and Viktor Ullmann's *Der König von Atlantis*, composed in Theresienstadt concentration camp.

[MUSIC 7231 Music and Postmodern Critical Theory]

Fall. 4 credits. Next offered 2011-2012. J. Perraino.]

[MUSIC 7232 History and Criticism]

Spring. 4 credits. Next offered 2010-2011. A. Richards.]

MUSIC 7240 Film and Music

Fall. 4 credits. D. Yearsley.

Topic: Film and music.

[MUSIC 7301 Topics in Ethnomusicology]

Spring. 4 credits. Also open to graduate students in anthropology, linguistics, psychology, sociology, Africana Studies, Asian Studies, and other cognate fields by permission of instructor. Next offered 2010-2011. S. Pond.]

MUSIC 7501 Historical Performance

Fall and spring. 4 credits each semester.

Prerequisite: permission of instructor. Staff. Lessons on the major instrument with supplementary study and research on related subjects.

MUSIC 7901 Independent Study and Research

Fall and spring. Credit TBA. Staff.

MUSIC 9901 Thesis Research

Fall and spring. Up to 6 credits each semester, TBA. S-U grades only.

Limited to doctoral students in music who have passed the Admission-to-Candidacy exam.

NEAR EASTERN STUDIES

K. Haines-Eitzen (chair), H. Al-Masri, R. Brann, Y. Chami, Z. Fahmy (director of undergraduate studies), I. Gocheleishvili, F. Hijazi, A. Karakaya-Stump, A. Kleinerman, C. Monroe, L. Monroe, D. I. Owen, J. Palmer, D. S. Powers (director of graduate studies), N. Scharf, S. Shoer, D. Starr (director of Program of Jewish Studies), S. M. Toorawa, A. Yavas, M. Younes. Joint faculty: G. Holst-Warhaft, C. Robinson

The Department

The Department of Near Eastern Studies (409 White Hall, 255-6275) offers courses in Near Eastern civilization including archaeology, history, religions, languages, and literatures. These course offerings treat the Near East from the dawn of history to the present and emphasize methods of historical, cultural, and literary analysis. Students are encouraged to take an interdisciplinary approach to the religions and cultures of the region and their articulation during antique, late antique, medieval, and modern times. For more information, please visit www.arts.cornell.edu/nest/.

The Major

A major in Near Eastern Studies offers students the opportunity to explore the languages, literatures, cultures, religions, and history of the Near East/Middle East from antiquity to the modern day. The major is designed both to acquaint students broadly with the region and its cultures as well as to study a particular subfield in depth.

Prerequisites

- The applicant for admission to the major in Near Eastern Studies must have completed at least two Near Eastern Studies content courses, one of which can be a language course. Students are strongly encouraged to enroll in language courses and/or NES 2651 or 2754 either before signing into the major or early on in their major.
- Prospective majors must meet with the director of undergraduate studies before submitting a major application.
- To qualify as a major, a cumulative grade average of C or better is required.

Major Requirements

For students graduating in the Classes of 2006 or earlier, consult the department. The precise sequence and combination of courses chosen to fulfill the major is selected in consultation with the student's advisor. All majors must satisfy the following requirements (no course may be used to satisfy two requirements; S-U option not permitted):

1. Two years of one Near Eastern language or, in exceptional cases, one year of two Near Eastern languages

2. Nine 3- or 4-credit NES courses, which must include the following:
- NES 2651 Judaism, Christianity, and Islam or NES 2754 Introduction to Near Eastern Civilizations
 - NES 4560 Junior/Senior Proseminar: Theory and Method in Near Eastern Studies
 - Seven additional courses, of which
- i. three must fulfill temporal breadth, defined as: one course whose chronological parameters fall within the period 3000 BCE to 600 CE, one course whose chronological parameters fall within the period 600 CE to 1800 CE, and one course whose chronological parameters fall between 1800 CE and the present. The following are examples (a complete list may be obtained in the department office):

3000 BCE to 600 CE

- NES 2623 Introduction to the Hebrew Bible
- NES 2629 Introduction to the New Testament
- NES 2644 Introduction to Ancient Judaism
- NES 2661 Ancient Seafaring
- NES 2666 Jerusalem through the Ages
- NES 3594 Gender, Sexuality, and the Body in Early Christianity ®
- NES 3623 Reinventing Biblical Narrative ®
- NES 3664 Ancient Iraq I
- NES 3665 Ancient Iraq II
- NES 3720 Women in the Hebrew Bible ®

600 CE to 1800 CE

- NES 2214 Qur'an and Commentary
- NES 2556 Introduction to the Qur'an
- NES 2634 Muslims and Jews in Confluence and Conflict
- NES 2655 Introduction to Islamic Civilization
- NES 2673 History of the Middle East: 13th to 18th Centuries
- NES 3539 Islamic Spain ®
- NES 3651 Law, Society, and Culture in the Middle East
- NES 4618 Seminar in Islamic History ®

1800 CE to the present

- NES 2635 Jews and Arabs in Contact and Conflict: The Modern Period
- NES 2674 History of the Modern Middle East: 19th to 20th Centuries
- NES 3685 Middle Eastern Cities ®
- NES 3693 History of Jews and Christians in the Modern Middle East
- NES 3697 History of the Israeli-Palestinian Conflict
- NES 3703 Cosmopolitan Alexandria ®
- NES 3719 Crime and Conflict in the Modern Arabic Novel

- ii. A maximum of three of these seven courses can be at the 2000 level; a minimum of four must be at the 3000 level or above.

- iii. One of the 3000-level or above courses must be a research seminar (courses are designated with ®) The following are examples (a complete list can be found in the department office):

3539 Islamic Spain: Culture and Society @ # (CA) ®

3594 Gender, Sexuality, and the Body in Early Christianity # (CA) ®

3685 Middle Eastern Cities: History, Society, and Culture @ # (HA) ®

4657 Formation of Islamic Law @ # (HA) ®

4727 New York, Paris, Baghdad: Poetry of the City) ®

- iv. Note: a maximum of two independent studies can be applied to the major; a maximum of two non-cross-listed courses may be applied to the major; a maximum of two courses may receive credit for more than one major; a maximum of 15 credits of relevant, departmentally approved course work taken overseas or at another university may be applied to the major.

For students graduating in the classes of 2006 or earlier, consult the department.

Honors. Each fall, a small number of highly qualified seniors enter the Near Eastern Studies Honors Program. The Honors Program is open to NES majors who have done superior work and who wish to devote a substantial part of their senior year to advanced, specialized, independent research and writing of a thesis.

Note well: Successfully completing an honors thesis will require sustained interest, exceptional ability, diligence, and enthusiasm. Students must also take two honors courses (NES 4998 in fall and NES 4999 in spring), in addition to the regular major requirements. While admission to the Honors Program and completion of a thesis do not guarantee that students will be awarded honors in Near Eastern Studies, most students find the experience as intellectually rewarding as it is rigorous.

Requirements. In order to be considered for the Honors Program, candidates must fulfill all of the following requirements:

- Minimum grade point average of 3.5 in the Near Eastern Studies major;
- Superior performance overall at Cornell (minimum 3.3 GPA);
- Completion of at least four semesters or equivalent in a relevant Near Eastern language;
- Satisfactory completion of an NES research paper ("®" course);
- Completion of at least one course in the subfield relevant to the proposed thesis (e.g., early Islamic history, modern Hebrew literature, etc.);
- Prospective honors students are **strongly encouraged** to take NES 4560 (NES Proseminar) in their **junior year**.

Study abroad. Students are encouraged to consult with their advisor about options and eligibility to study abroad. With appropriate advance consultation and approval upon return, NES will accept credits earned abroad toward the major. Students are reminded that

the College of Arts and Sciences requires that they carry a minimum of 15 credits during a semester abroad.

First-Year Writing Seminars

For descriptions, consult the John S. Knight Institute brochure for times, and instructors.

Language Courses

Arabic

NES 1201-1202 Elementary Arabic I and II (also ASRC 1104/1105)

1201, fall; 1202, spring or summer. 4 credits each semester. Limited to 18 students per sec. Prerequisite: for NES 1202, NES 1201 or permission of instructor. M. Younes and staff.

Provides a thorough grounding in all language skills: listening, speaking, reading, and writing. It starts with spoken Arabic and gradually integrates Modern Standard Arabic in the form of listening and reading texts. Emphasis is on learning the language through using it in meaningful contexts. Students who successfully complete the two-semester sequence are able to (1) understand and actively participate in simple conversations involving basic practical and social situations (e.g., introductions, greetings, school, home and family, work, simple instructions); (2) read Arabic material of limited complexity and variety (e.g., simple narrative and descriptive texts, directions); (3) write notes and short letters describing an event or a personal experience. An important objective of the course is to familiarize students with basic facts about the geography, history, and culture of the Arab world.

NES 1203-2200 Intermediate Arabic I and II (also ASRC 1106/2101)

1203, fall; 2200, spring or summer. 4 credits each semester. *NES 2200 @ satisfies Option 1.* Limited to 18 students per sec. Prerequisites: for NES 1203, one year of Arabic or permission of instructor; for NES 2200, NES 1203 or permission of instructor. Letter grades recommended. M. Younes and staff.

Sequel to NES 1201-1202. Continued development of the four language skills through extensive use of graded materials on a wide variety of topics. Increased attention is given to developing native-like pronunciation and grammatical accuracy, but the main focus is on developing communication skills. The student who successfully completes 2200 is able to: (1) understand and express himself or herself in Arabic in situations beyond the basic needs; (2) read and comprehend written Arabic of average difficulty; (3) write a letter, a summary of a report, or a reading selection. An appreciation of Arabic literature and culture is sought through the use of authentic materials.

[NES 2203 Elementary Arabic for Native Speakers

Spring. 4 credits. *Satisfies Option 1.* Prerequisite: fluency in a spoken Arabic dialect. Next offered 2010-2011. M. Younes.]

NES 2204 Introduction to Quranic Arabic (also ASRC 2106, RELST 2204) (LA-AS)

Spring. 4 credits. Prerequisite: knowledge of Arabic alphabet. H. Al-Masri.

This course is designed for students who are interested in reading the language of the Qur'an with accuracy and understanding. The first week (4 classes) will be devoted to an introduction of the history of the Qur'an: the revelation, collection, variant readings, and establishment of an authoritative edition. The last week will be devoted to a general overview of "revisionist" literature on the Qur'an. In the remaining 12 weeks, we will cover all of Part 30 (Jus' Amma, suuras 78-114) and three suuras of varying length (36, 19, and 12). We will start with the shortest suuras and move gradually to longer ones. The Suuras will be presented and analyzed, and new vocabulary and grammatical structures will be discussed, explained, and practiced systematically. Each lesson will include, in addition to the text of the suura, word-building exercises devised to facilitate the acquisition and retention of new vocabulary. At the end of the semester, the successful student will have mastered a working vocabulary of between 1500 and 2000 words, correct pronunciation, and the most commonly used grammatical structures. In addition, the course will provide the student with a firm foundation on which to build advanced study of Classical Arabic.

NES 3201-3202 Advanced Intermediate Arabic I and II (also ASRC 3100-3101) @

3201 fall; 3202, spring. 4 credits each semester. *NES 3201 satisfies Option 1.* Limited to 15 students. Prerequisite: for NES 3201, NES 2200 or permission of instructor; for NES 3202, NES 3201 or permission of instructor. Letter grades recommended. M. Younes and staff. Introduces students to authentic, unedited Arabic language materials ranging from poems, short stories, and plays to newspaper articles dealing with social, political, and cultural issues. Emphasis is on developing fluency in oral expression through discussion of issues presented in the reading selections. There is more focus on the development of native-like pronunciation and accurate use of grammatical structures than on elementary and intermediate Arabic. A primary objective of the course is the development of writing skill through free composition exercises in topics of interest to individual students.

NES 3203-3204 Current Events in Arabic Media @ (CA-AS)

3203, fall; 3204, spring. 4 credits. F. Hijazi. In this course students will be introduced to authentic, unedited Arabic language materials from Arabic newspapers, magazines, TV broadcasts and interviews, and other on-line media. The topics covered will include, among other things, politics, economics, business, sports, and women's issues. Students can suggest other topics that interest them to the teacher. Emphasis will be on developing fluency in oral and written expression through discussions, debates, presentations, and written work. The order of activities for each topic will be: reading or listening to a selection before coming to class, class discussion and/or debate, an oral presentation by the students, and, finally, a written homework assignment about the same topic. All activities are conducted entirely in Arabic. There will be more focus on the development of native-like pronunciation and accurate use of grammatical structures than at the lower levels.

[NES 4203 Readings in Arabic Poetry (LA-AS)]

Fall. 4 credits. Prerequisite: NES 3202, a 4000-level NES Arabic course, or permission of instructor. Next offered 2010-2011. S. M. Toorawa.]

NES 4206 Structure of the Arabic Language (also LING 4416) @ (KCM-AS)

Spring. 4 credits. Prerequisite: 1 year of Arabic or linguistic background. Staff. The course consists of a brief history of Arabic and its place in the Semitic language family, the sociolinguistic situation in the Arab world (diglossia), Arabic phonology (sounds, emphasis, syllable structure, and related processes), morphology (verb forms and derivational patterns), and syntax (basic sentence structures, cases, and moods).

[NES 4211 Readings in Arabic Literature # @ (LA-AS)]

Fall. 4 credits. Prerequisite: NES 3202, a 4000-level Arabic course, or permission of instructor. Next offered 2010-2011. S. M. Toorawa.]

Intensive Arabic Program (IAP)

Modeled in part on the FALCON program in Chinese at Cornell University, the Intensive Arabic Program is designed to help students attain proficiency in Arabic in both its spoken and written forms in a condensed period of time. The program consists of three phases: (1) The first phase covers the equivalent of elementary Arabic I and II, and can be taken during the fall and spring semesters of the academic year, or as part of the Arabic summer intensive program. (2) The second phase covers the equivalent of Intermediate Arabic I and II and Advanced Arabic I and II and is taken in a total immersion environment at Cornell. During this phase, up to 12 students will take only Arabic classes for the duration of the fall semester. (3) The third phase takes place at the Hashemite University in Jordan during the following spring semester. The students who successfully complete the second phase will spend the spring semester at the Hashemite University with one of the teachers in the Cornell Arabic program. The course work will be taught entirely in Arabic and will focus on Arab society and culture, the Arabic language, and the modern Middle East.

Credits for Cornell Undergraduates

The fall and spring semesters will each be the equivalent of 16 credits for Cornell undergraduates. Ideally, students would enroll in the yearlong program during their junior year, but the other years are also a possibility. The program will enable students to fulfill their language requirement and, depending on their major, they would have the option of applying the other courses toward their major. For Near Eastern Studies majors, all the courses would go toward the major (beyond the NES 1103 language course). Nonmajors will be able to count the spring courses toward the geographic breadth requirements. Upon their return, students would have the option of continuing their study of Arabic by enrolling in 4000-level Arabic courses in NES.

Cornell undergraduates seeking degrees in colleges other than Arts and Sciences, please note that you will be transferred to the College of Arts and Sciences during IAP. This

means that all costs will be assessed according to Arts and Sciences rates, not those of your "home" college.

For further information, contact the Department of Near Eastern Studies, 409 White Hall, 255-6275 or visit our web site, www.arts.cornell.edu/nas.

NES 3206 Intensive Arabic Program (IAP)

Fall. 16 credits. *Satisfies Option 1.* M. Younes and staff.

In the first half of this 16-credit total immersion course, we will continue to develop the four language skills of listening, speaking, reading, and writing through the extensive use of graded materials on a wide variety of topics (education, food, health, sports, religion, politics, economics, etc.). In the second half, students will be introduced to authentic, unedited Arabic language materials ranging from short stories, poems, and songs to newspaper articles dealing with social, political, and cultural issues related to the Arab world and the Middle East. While more attention is given to developing native-like pronunciation and grammatical accuracy than in NES 1101-1102, the main focus of the course will be on encouraging fluency and facility in understanding the language and communicating ideas in it. Building on the foundation started in NES 1101-1102, the course will continue the practice of introducing Arab society, history, and culture. Oral and written expression will be developed through discussions of issues presented in the reading selections, which will be followed by free composition exercises built around topics of interest to individual students.

NES 3207 Current Events in Arabic Media (IAP)

Spring. 8 credits. M. Younes and staff. In this 8-credit, one-semester, topic-based course, students will be introduced to authentic, unedited Arabic language materials from Arabic newspapers, magazines, TV broadcasts and interviews, and online media. Topics will include, among other things, politics, economics, business, sports, and women's issues. Students can suggest other topics that interest them to the teacher. Emphasis will be on developing fluency in oral and written expression through discussions, debates, presentations, and written work. The order of activities for each topic will be: reading or listening to a selection before coming to class, class discussion and/or debate, an oral presentation by the students, and, finally, a written homework assignment about the same topic. All activities are conducted entirely in Arabic. There will be more focus on the development of native-like pronunciation and accurate use of grammatical structures than at the lower levels.

NES 3213 Introduction to Jordanian Society (IAP)

Spring. 4 credits. M. Younes and staff. Selected readings and discussions on the following topics: (1) the history of the Hashemite Kingdom of Jordan; (2) urban, rural, and bedouin communities, and urbanization; (3) Palestinians and other Arab refugees in Jordan; (4) the Jordanian/Arab family (structure, responsibilities, functions); (5) marriage (and divorce); (6) women and gender roles; (7) the role of religion in the society.

NES 4204 Arabic Grammar (IAP)

Spring. 4 credits. M. Younes and staff.
A systematic and comprehensive examination of all aspects of Arabic grammar: phonology (the sound system), morphology (word formation), and syntax (sentence structure). All the readings and discussions will be in Arabic. References in English will be used for research purposes.

Greek**NES 1340-1341 Elementary Modern Greek I and II (GREEK 1141-1142)**

1340, fall; 1341, spring. 4 credits.
Prerequisite: NES 1340/GREEK 1141 or placement by departmental exam.
K. Yiavis.

For description, see GREEK 1141-1142.

NES 1342-2324 Intermediate Modern Greek I and II (GREEK 1143-2144)

Fall. 4 credits. *NES 2324/GREEK 2144 satisfies Option 1.* Prerequisite: NES 1341/GREEK 1142 or placement by departmental exam. K. Yiavis.

For description, see GREEK 1143-2144.

Hebrew**NES 1101-1102 Elementary Modern Hebrew I and II (also JWST 1101-1102)**

1101, fall; 1102, spring. 4 credits each semester. Limited to 18 students per sec. Prerequisite: for NES 1102, NES 1101 with grade of C- or better or permission of instructor. Letter grades only. S. Shoer.

Intended for beginners. Provides a thorough grounding in reading, writing, grammar, oral comprehension, and speaking. Students who complete the course are able to function in basic situations in a Hebrew-speaking environment.

NES 1103 Elementary Modern Hebrew III (also JWST 1103)

Fall. 4 credits each semester. Limited to 15 students per sec. Prerequisite: NES 1102 with grade of C- or better or permission of instructor. Letter grades recommended. N. Scharf.

Sequel to NES 1101-1102. Continued development of reading, writing, grammar, oral comprehension, and speaking skills.

NES 1104 Beginners Intensive Hebrew (also JWST 1104)

Summer. 3 credits. S. Shoer.

This course will be taught in Israel as part of the University of Haifa Summer Hebrew Program. The curriculum is comparable to the current Cornell University class NES 1101 or JWST 1101 (Elementary Modern Hebrew I). After completing this program, students will be able to continue and join the Elementary Modern Hebrew II class (NES 1102 or JWST 1102) in the spring 2010 semester. The class is taught using *Ivrit B'Ivrit* (Teaching Hebrew using Hebrew) and is part of a comprehensive integrated skills curriculum, based on Hebrew as a living language. Students are encouraged to use Hebrew from the moment they wake up, during their meals and throughout the day. The students study grammar, reading, writing, structure of the language, listening, and conversation.

NES 1105 Hebrew Summer Follow-Up (also JWST 1105)

Fall. 1 credit. S. Shoer.

This course is an advanced study of classical Arabic through a close reading of selected chapters of the Qur'an, together with the Qur'anic commentary (tafsir) and other relevant literature. Special attention is given to grammar, syntax, and lexicography.

NES 2100 Intermediate Modern Hebrew: Special Topics in Hebrew (also JWST 2100) @

Spring. 4 credits. *Satisfies Option 1.* Prerequisite: NES 1103 with grade equivalent to C- or above or permission of instructor. Letter grades recommended. N. Scharf.

The course is aimed at training students in exact and idiomatic Hebrew, expanding vocabulary and usage of grammatical knowledge, and acquiring facility of expression in both conversation and writing. Uses written and oral exercises built around the texts. Reading and discussion of selections from Hebrew literature and Israeli culture through the use of texts and audiovisual materials. See web site: <http://Irc.cornell.edu/hebrew/nest100>.

NES 3101 Advanced Intermediate Modern Hebrew I: Aspects of Israeli Society (also JWST 3101) @

Fall. 4 credits. *Satisfies Option 1.* Limited to 15 students. Prerequisites: for 3101, NES 2100 with grade of C- or above or permission of instructor. N. Scharf.

Advanced study of the Hebrew language both orally and through the analysis of mostly unedited texts of social, political, and cultural relevance, with less emphasis on the study of grammar. Students are introduced to articles published in Israeli newspapers and magazines, works by authors, and movies. Students develop composition and advanced writing skills by studying language structure, idioms, and various registers of style.

NES 3102 Advanced Intermediate Modern Hebrew II: Aspects of Israeli Culture (also JWST 3102)

Spring. 4 credits. *Satisfies Option 1.* Limited to 15 students. Prerequisite: NES 3101 with grade equivalent to C- or above or permission of instructor. Letter grades recommended. N. Scharf.

This course is a continuation of work done in NES/JWST 3101, with less emphasis on the study of grammar. We will read and discuss texts of cultural relevance using articles published in Israeli newspapers, web sites, and works by authors in each of the three principal genres: poetry, theater, and novels. See web site: <http://Irc.cornell.edu/hebrew/nest3102>.

[NES 3103 Love, Wine, Death, and In Between (also JWST 3103) @ # (CA-AS)]

Fall. 4 credits. Prerequisite: NES 3102 or permission of instructor. Letter grades recommended. Next offered 2010-2011. S. Shoer.

This course introduces students to a survey of Hebrew poetry from medieval Spain to modern Israel, with focus on secular themes of romance, life pleasures, and esthetic enjoyments. It is intended to continue the development of all aspects of the language. Emphasis is on developing fluency in oral expression through discussion of the reading selections and the development of writing skill.]

NES 3105 Intensive Conversational Hebrew (also JWST 3105)

Fall. 2 credits. Limited to 15 students. Prerequisite: NES 3102, 4100, or permission of instructor; non-native speakers only. Letter grades recommended. N. Scharf.

[NES 4101 Modern Hebrew Literature (also JWST 4101) @ (LA-AS)]

Spring. 4 credits. Next offered 2010-2011. D. Starr.]

NES 4102 Biblical Hebrew Prose—Genesis (also JWST/RELST 4102) @ # (LA-AS)

Fall. 4 credits. *Satisfies Option 1.* Prerequisite: one year of biblical or modern Hebrew. L. Monroe.

From the Garden of Eden to Noah's Ark, from Abraham's journey from Haran to Joseph's coat of many colors, the book of Genesis contains stories that are at once familiar to Western readers, and foreign in their ancient Near Eastern setting. Through reading the book of Genesis in the original Hebrew, this course will address issues such as how the Israelites understood their origins, and their relationships with their God, Yahweh, their neighbors, and the land of Canaan itself, as well as how these themes are developed in biblical myth and folklore. Close attention will be paid to matters of grammar, syntax, and vocabulary in order to develop students' skills in reading biblical Hebrew prose and to enhance their understanding of the Hebrew language itself as a window on ancient Israelite thought. Students will be expected to utilize commentaries, biblical Hebrew grammars, and lexicons in their preparation of assigned texts.

Hindi-Urdu**NES 1312 Introduction to Urdu Script (also URDU 1125)**

Fall. 1 credit. S. Singh.

For description, see URDU 1125.

NES 2201-2202 Intermediate Written Urdu I and II (also URDU 2201-2202)

2201, fall; 2202, spring. 2 credits. Prerequisite: HINDI 1102 or HINDI 1110; and URDU 1125 or permission of instructor. Letter grades only. S. Singh.

For description, see URDU 2201-2202.

Persian**NES 1320-1321 Elementary Persian I and II**

1320, fall; 1321, spring. 4 credits each semester. Limited to 15 students. I. Gocheleishvili.

Designed for students who want an effective and comprehensive approach to learning Persian that will enable them to progress in the language skills of speaking, listening, reading, and writing. At the completion of this course, students are prepared to deepen their comprehension of Persian through literature and the media.

NES 1322-2322 Intermediate Persian I and II

1322, fall; 2322, spring. 4 credits. *NES 2322 @ satisfies Option 1.* Prerequisite: one year (two semesters) elementary Persian or permission of instructor. I. Gocheleishvili.

A continuation of NES 1320-1321. Continued development of speaking, listening, reading, and writing skills.

Turkish

NES 1330-1331 Elementary Turkish I and II

1330, fall; 1331, spring. 4 credits each semester. Limited to 15 students. A. Yavas. Intended for students with no experience in Turkish. The goal is to provide a thorough grounding in Turkish language with an emphasis on communication. Small class size provides intensive practice in speaking, writing, and listening/comprehension. The course is co-sponsored by the Institute for European Studies.

NES 1332-2332 Intermediate Turkish I and II

1332, fall; 2332, spring. 4 credits. *NES 2332 satisfies Option 1.* Prerequisite: one year (two semesters) elementary Turkish or permission of instructor. Staff. A continuation of NES 1330-1331. Continued development of speaking, listening, reading, and writing skills.

Ancient Near Eastern Languages

Hieroglyphic Egyptian

NES 3450-3451 Hieroglyphic Egyptian I and II

3450, fall; 3451, spring. 4 credits. A. Kleinerman. An introduction to the grammar and writing system of the classical language of the Egyptian Middle Kingdom (ca. 2135-2000 BC). Students learn to read and write hieroglyphics, begin immediately to read *The Tale of the Shipwrecked Sailor*, and are soon reading historical inscriptions of Ramesses II, selections from the Book of the Dead and the Pyramid texts, as well as myths and wisdom literature. Secondary readings in Egyptian history and culture provide context for the texts we will read in the original glyphs.

Topics Courses

[NES 2525 Islam in America (also AMST/RELST 2525) (CA-AS)]

Summer. 3 credits. Next offered 2010-2011. S. M. Toorawa.]

NES 2537 Ninth-Century Baghdad and Its "Bad Boys and Girls" @

Spring. 3 credits. No prerequisites. S. M. Toorawa. The ninth and 10th centuries in Baghdad have come to be known as the "golden age." In this course we will read works from this golden age, in particular by and about a group I call the "bad boys and girls of Baghdad." We will read Jahiz on envy; Ibn al-Muqaffa' on rulership; Mas'udi on Ja'far (remember Disney's *Aladdin*?). We will read about the caliph Harun al-Rashid and the elephant he sent to Charlemagne. And we will enter the world of the singing sensation "Arib," who was the lover of some of Baghdad's most famous men. We will see how paper, books, and writing changed Baghdad, Islamic society, and human knowledge, and how Arab-Islamic society's contributions changed the world. Weekly thought essays and a final project.

NES 2611 Prophecy in Ancient Israel (also JWST/RELST 2611)

Spring. 3 credits. L. Monroe. The purpose of this course is to examine the phenomenon of prophecy in the religion of ancient Israel, as it is revealed through prophetic texts within the Hebrew Bible. We

will seek to understand the social reality that underlies both the content and composition of these texts, and the relationship of the prophet to the Israelite institutions of the temple/cult and palace. We will implement literary critical, historical, sociological, and anthropological approaches in an effort to reconstruct the development of Israelite prophecy from its earliest appearance in narrative sources to its alleged cessation during the Second Temple Period.

NES 2620 Modern European Jewish History 1789-1948 (also HIST 2910, JWST 2920)

Fall. 3 credits. S. Gutman. For description, see HIST 2910.

NES 2629 Introduction to New Testament and Other Early Christian Literature (also CLASS 2613, JWST/RELST 2629) @ # (HA-AS)

Spring. 3 credits. K. Haines-Eitzen. This course provides a literary and historical introduction to the earliest Christian writings, most of which eventually came to be included in the New Testament. Through the lens of the gospel narratives and earliest Christian letters, especially those of Paul, the course explores the rich diversity of the early Christian movement, from its Jewish roots in first-century Palestine through its development and spread to Asia Minor and beyond. Careful consideration is given to the political, economic, social, cultural, and religious circumstances that gave rise to the Jesus movement, as well as those that facilitated the emergence of various manifestations of early Christian beliefs and practices. (Students who have had at least one year of Greek and would like to participate in a 1-credit, New Testament Greek reading weekly seminar should also enroll in NES 3629 Introduction to New Testament and Other Early Christian Literature.)

[NES 2651 Holy War, Crusade, and Jihad (also COML 2310, HIST 2691, JWST 2651) # @ (HA-AS)]

Fall. 3 credits. Next offered 2010-2011. R. Brann.]

NES 2655 Introduction to Islamic Civilization (also HIST 2530, RELST 2655) @ # (HA-AS)

Fall. 3 credits. D. Powers. Considers the major themes of Islamic civilization as they developed from the lifetime of Muhammad until the 20th century. While the readings provide the student with the chronology of Islamic history, lectures are devoted to an analysis of thematic units, such as art and architecture, science, and cities. The class meets three times weekly, and the classroom format is that of a lecture/discussion in which students are encouraged to participate actively. Lectures are accompanied by slide presentations when appropriate.

NES 2661 Ancient Ships and Seafaring—Introduction to Nautical Archaeology (also ARKEO/JWST 2661) @ # (HA-AS)

Fall. 4 credits. C. Monroe. A survey of the history and development of ships and seafaring as revealed by shipwrecks, boat burials, texts, art and other evidence. The role of nautical technology and seafaring among the maritime peoples of the ancient Mediterranean world—Canaanites, Minoans, Mycenaean, Phoenicians, Hebrews, Greeks, and Romans—as well as the riverine cultures

of Mesopotamia and Egypt, is addressed. The survey stretches from the earliest evidence for Mediterranean seafaring around 10,000 BCE to the first transatlantic voyages in the 15th century, including Arab, Viking, and European explorers, and the birth of modern capitalism in the Italian Maritime Republics. Along the way, economics, war, exploration, cult, life at sea, and colonization are discussed.

NES 2668 Ancient Egyptian Civilization (also ARKEO/JWST 2668, HIST 2880) @ # (HA-AS)

Spring. 3 credits. C. Monroe. The course surveys the history and culture of pharaonic Egypt from its prehistoric origins down to the early first millennium BCE. Within a chronological framework, the following themes or topics will be considered: the development of the Egyptian state (monarchy, administration, ideology); social organization (class, gender and family, slavery); economic factors; empire and international relations.

NES 2674 History of the Modern Middle East: 19th-20th Centuries (also HIST/JWST 2674, GOVT 2747) @ (HA-AS)

Fall. 3 credits. Z. Fahmy. This course examines major trends in the evolution of the Middle East in the modern era. Focusing on the 19th and 20th centuries, we will consider Middle East history with an emphasis on four themes: imperialism, nationalism, modernization, and Islam. Readings will be supplemented with translated primary sources, which will form the backbone of class discussions.

NES 2699 History of the Ottoman Empire, 1300-1922 (also HIST 2699)

Spring. 3 credits. A. Karakaya-Stump. The Ottoman Empire was one of the longest-lasting empires in world history, ruling over a large portion of the Middle East and the Balkans for nearly six centuries. It figures as a major power in the history of both Europe and the Islamic world. This course is an introductory survey of the history of the empire from its origins as a small principality in medieval Anatolia to a leading world power in the 16th century, and to its eventual disintegration by the end of World War I. It explores the major events of Ottoman political history, the main economic, social, and cultural institutions of the Ottoman state and society, and some recent trends in Ottoman historiography including debates on the origins and decline of the Ottomans, and the growing research on Ottoman women.

NES 2724 Introduction to Hebrew Bible (also JWST/RELST 2724) (LA-AS)

Fall. 3 credits. L. Monroe. The Hebrew Bible (Old Testament) is a repository of ancient Israelite religious, political, social, historical, and literary traditions. For the modern reader these ancient traditions are often obscured by a focus on the text as revelation. The purpose of this course is to introduce students to the biblical world by reading the Hebrew Bible in translation, on its own terms, as a body of literature that evolved in an ancient Near Eastern context. The Bible itself will be the primary text for the course, but students will also be exposed to the rich and diverse textual traditions of the ancient Near East, including Mesopotamia, Egypt, Moab, and Ugarit. In addition, this course will explore the impact of early biblical interpretation on shaping the monotheistic traditions inherited in the West. As participants

in a secular course on the Bible, students will be challenged to question certain cultural assumptions about the composition and authorship of the Bible, and will be expected to differentiate between a text's content and its presumed meaning.

NES 2728 Introduction to Modern Middle Eastern Literature (also COML 2728)
Spring. 3 credits. D. Starr.

This course offers an introduction to modern literatures in Arabic, Hebrew, Persian, and Turkish. All readings will be in English. We will discuss poetry, short stories, and a novel from each tradition. Readings will be drawn from the work of an array of influential authors, including Nobel laureates S. Agnon (Israel), Naguib Mahfouz (Egypt), and Orhan Pamuk (Turkey).

NES 2754 Introduction to Near Eastern Civilization: The Literature of Princes, Prophets, and Poets (also COML 2754) @ # (LA-AS)
Fall. 3 credits. S. M. Toorawa.

This course (which also fulfils an NES major requirement) is a multidisciplinary introduction to Near Eastern civilizations, exploring history, literature, religion, art, and archeology, and other aspects of the Near East's rich and diverse heritage from earliest times to the present. Together we will read and discuss such ancient works as the *The Epic of Gilgamesh*, "The Song of Songs," and the *Qur'an*, such medieval works as the *Travels of Ibn Battuta*, the *Shahnameh* of Ferdowsi, and the poems of Yehuda Ha-Levi, and modern material from the Arabic, Armenian, Hebrew, Persian, and Turkish literary traditions. We will also watch films and be joined by outside speakers. All material is in English translation.

[NES 2793 Middle Eastern Cinema (also COML/FILM 2930, JWST 2793, VISST 2193) @ (LA-AS)]

Fall. 4 credits. Next offered 2010–2011. D. Starr.]

NES 3212 Qur'an and Commentary (also RELST 3212) @ # (LA-AS)

Fall. 4 credits. D. Powers.

This course is an advanced study of classical Arabic through a close reading of selected chapters of the Qur'an, together with the Qur'anic commentary (tafsir) and other relevant literature. Special attention is given to grammar, syntax, and lexicography.

[NES 3524/6524 Israelite Prophecy (also JWST/RELST 3524) @ # (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. L. Monroe.]

[NES 3551 Law, Society, and Culture in the Middle East (also HIST 3651/6651, NES 6551) @ # (CA-AS)]

Spring. 4 credits. No prerequisites. Next offered 2010–2011. D. Powers.]

NES 3588 Biblical Archaeology (also JWST/RELST 3588)

Spring. 4 credits. L. Monroe.

The purpose of the course is to place the Bible within the context of a larger ancient world that can be explored by systematic excavation of physical remains. Students will become familiar with archaeological excavations and finds from ancient Syria-Palestine from 10,000 BCE to 586 BCE. We will explore this archaeological evidence on its own terms, taking into consideration factors such as archaeological method and the interpretive frameworks in which the

excavators themselves work, as well as the implications of this body of evidence for understanding the complexity and diversity of biblical Israel.

NES 3600 History of the Holocaust (also HIST/JWST 3700) (HA-AS)

Spring. 4 credits. V. Caron.

For description, see HIST 3700.

[NES 3619 Near Eastern Christianities, 50–650 CE (also HIST/JWST/RELST 3619) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011.

K. Haines-Eitzen.]

NES 3629 Introduction to New Testament and Other Early Christian Literature (also CLASS/JWST/RELST 3629)

Spring. 1 credit. Pre- or corequisite: NES 2629 or one year of ancient Greek.

K. Haines-Eitzen.

A weekly seminar that may be taken in addition to NES 2629. The seminar will provide an opportunity to read portions of the New Testament and other early Christian writings in Greek. We will work on grammatical and textual issues as well as other problems related to translations.

NES 3633 Christianization of the Roman World (also CLASS/HIST/RELST 3625) @ # (HA-AS)

Fall. 4 credits. E. Rebillard.

For description, see CLASS 3625.

[NES 3661 Sumerian Language and Culture I (also ARKEO/JWST 3661/6661, NES 6661) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011.

D. I. Owen.]

[NES 3665 Ancient Iraq II: 2000–331 BCE (also ARKEO/JWST 3665) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011.

D. I. Owen.]

[NES 3666 History and Archaeology of the Ancient Near East (also ARKEO/JWST 3666/6666, NES 6666) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011.

D. I. Owen.

An introductory survey of the history and archaeology of the major civilizations of the Near East from the Persian Gulf—Mesopotamia—to Anatolia, Syria and Canaan. The course will cover the time span from advent of written sources in the late fourth millennium to the Persian conquest of Cyrus. Sumerian, Babylonian, Eblaite, Elamite, Canaanite, Assyrian, Syro-Phoenician, and Israelite cultures will be discussed with particular emphasis on indigenous developments and cross-cultural contacts. Extensive use of visual aids will highlight the course.]

NES 3670 History of Modern Egypt (also HIST 3670)

Spring. 3 credits. Z. Fahmy.

This lecture class will explore the socio-cultural history of modern Egypt from the late 18th century to the present. We will explore Egyptian history under the Ottomans and the Mamluks, the unsuccessful French attempt to colonize Egypt, and the successful British occupation of the country. We will then examine the development of Egyptian nationalism from the end of the 19th century through Nasser's pan-Arabism to the current Mubarak regime. We will accomplish this with the aid of a variety of texts and media, including novels and films.

NES 3677 Search for the Historical Muhammad (also HIST/RELST 3677)

Spring. 4 credits. D. Powers.

Unlike Moses or Jesus, Muhammad is said to have been born in the full light of history. The earliest extant biography of the Prophet, the *Life of Muhammad* by Ibn Hisham (d. 833), contains a full account of the Prophet's career, from his birth ca. 570 to his death in 632. In this seminar, we will read the *Life of Muhammad* and analyze selected episodes from a critical historical perspective.

NES 3697 Israeli-Palestinian Conflict (also GOVT 3977, HIST/SOC 3970, JWST 3697) @ (HA-AS)

Spring. 4 credits. R. Brann.

This course examines the history of the conflict between two peoples with claims to the same land (Palestine/Israel), from the rise of their national movements at the turn of the 20th century and their eventual clash down to the present crisis. We will investigate the various stable and shifting elements in the evolution of the conflict including conflicting Israeli and Palestinian narratives and mythologies about the nature of the conflict. Among many issues to be addressed are: the relationship of this conflict to the history of European colonialism in the Middle East, the emergence of Pan-Arabism and Islamism, the various currents in Zionism and its relationship to Judaism, the implication of great power rivalry in the Middle East, the different causes and political repercussions of the four Arab-Israeli wars, efforts at peacemaking including Oslo and Camp David, and the significance of the two Palestinian uprisings.

[NES 3703 Cosmopolitan Alexandria (also NES 6703) @ (LA-AS) @]

Spring. 4 credits. Next offered 2010–2011. D. Starr.]

[NES 3709 Modern Arabic Drama @ (LA-AS) @]

Spring. 4 credits. Next offered 2010–2011. S. M. Toorawa.]

[NES 3716 Education of Princes: Medieval Advice Literature of Rulership and Counsel (also COML/GOVT 3716) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011. S. M. Toorawa.]

[NES 3720 Women in Ancient Israel (also JWST/RELST 3270) @ (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. L. Monroe.]

NES 3723 The Arabian Nights: Then and Now (also COML 3723/6723, NES 6723) @ # (LA-AS)]

Fall. 4 credits. No prerequisites. S. M. Toorawa.

The medieval Arabic cycle of stories known as *The Arabian Nights* or *The Thousand and One Nights* is a classic of world literature. In the first half of the course we will read the Nights and discuss both its dominant themes—deceit, love, sex, revenge, violence, and justice—and its storytelling contexts and antecedents (e.g., the Sanskrit *Jataka Tales* and the Middle Persian *Tales of Bīd-pai*). And in the second half, we will explore the ways in which its themes and tales have been adapted and appropriated by authors such as Jan Potocki in Polish, Edgar Allan Poe and John Barth in English, Jorge Luis Borges in Spanish, and Naguib Mahfouz in Arabic itself. All material is in English translation.

NES 3759 Romanesque and Early Gothic Art and Architecture: Europe and the Mediterranean, 900-1150 AD (also ARTH 3300) # (LA-AS)

Spring. 4 credits. C. Robinson.
For description, see ARTH 3300.

NES 3799 Imagining the Other: Jews and Arabs in Contemporary Literature and Film (also COML/JWST 3799) @ (LA-AS)

Fall. 4 credits. D. Starr.
This class explores fictional works that reflect upon the Israeli-Palestinian conflict. Topics addressed include the Israeli occupation of the West Bank and Gaza Strip; Palestinian suicide bombings; and Israeli military incursions into Lebanon. Each unit will feature multiple works of film and literature from Arab and Jewish perspectives. We will consider the implications of representing violence and approaching politically fraught topics through fiction. While the films and literary texts we will discuss were all originally produced in Arabic or Hebrew, all course materials will be in English.

NES 3844 Islamic Politics (also GOVT 3344) @ (SBA-AS)

Fall. 4 credits. D. Patel.
For description, see GOVT 3344.

NES 3850 Middle Eastern Politics (also GOVT 3313) @ (CA-AS)

Spring. 4 credits. D. Patel.
For description, see GOVT 3313.

NES 3914 Middle Eastern Music Ensemble (also MUSIC 3614)

Fall and spring. 1 credit each semester. Limited to 40 students. Prerequisite: permission of instructor. G. Holst-Warhaft.
For description, see MUSIC 3614.

[NES 4101 Modern Hebrew Literature (also JWST 4101) @ (LA-AS)]

Spring. 4 credits. *Satisfies Option 1.*
Prerequisite: NES 4100 or equivalent.
Students who successfully completed 3102 may enroll with permission of instructor.
Next offered 2010-2011. Staff.]

[NES 4211 Readings in Arabic Literature (LA-AS)]

Spring. 4 credits. Next offered 2010-2011.
S. M. Toorawa.]

NES 4501 Islam in Africa and Diaspora (also ASRC 4201/6206) (CA-AS)

Spring. 4 credits. A. Mazrui.
For description, see ASRC 4201.

[NES 4511 The Multicultural Alhambra (also ARTH 4311, VISST 4621)]

Spring. 4 credits. Next offered 2010-2011.
C. Robinson.
For description, see ARTH 4311.]

[NES 4540 Maimonides and Averroes (JWST/RELST 4540, SPAN 4380) @ # (CA-AS)]

Spring. 4 credits. Next offered 2010-2011.
R. Brann.]

NES 4550 The World of the Phoenicians (also HIST 4552, JWST 4550)

Spring. 4 credits. C. Monroe.
The Phoenicians were an enigmatic culture and people who originally lived in a coastal region approximately where Lebanon is today. An ancient Semitic people known for seafaring and inventing our alphabet, they left us virtually no texts of their own. The Phoenicians are known mostly from the writings of others, notably ancient Greeks and

biblical authors, and from artifacts in ivory, stone, and metal. In order to understand their material culture and historical importance, we must look broadly in time and space, and this reveals to us a "world" of cultural interactions that stretches across the Mediterranean and Near East, and from the Early Bronze Age or third millennium BCE into Greco-Roman times. We will read about the Phoenician homeland and its colonies, and investigate their maritime economy, language, religion, and adventures abroad. In doing so, we will be exploring the ancient Mediterranean and beyond and meeting a host of other fascinating peoples in the process. Some research and a written paper will be required.

NES 4560 Theory and Method in Near Eastern Studies (CA-AS)

Spring. 4 credits. Requirement for NES majors. Z. Fahmy.
Seminar offering advanced Near Eastern Studies students the opportunity to read and discuss the range of theories and methods that have been employed by scholars in the interdisciplinary area of Near Eastern Studies. After giving attention to the historical development of area studies programs—and their current status and relevance—students read a wide range of highly influential works in Near Eastern Studies. Literary theory, historiography, post-colonialism, archaeology, gender theory, and comparative religions are a few of the approaches, methods, and theories explored. Authors include Talal Asad, Homi K. Bhabha, Mircea Eliade, Timothy Mitchell, Mary Douglas, Zachary Lockman, Edward Said, J. Z. Smith.

NES 4600 Religion and Imperial Politics in the Early Modern Middle East (also HIST 4611) @ # (HA-AS)

Fall. 4 credits. This course is designed for graduates and advanced undergraduates who preferably have taken at least an introductory level course in Islamic and/or Middle Eastern History. A. Karakaya-Stump.
The Early Modern Middle East was dominated by two regional empires: the Ottomans in Anatolia and the Balkans, and the Safavids in Iran. This seminar explores the interplay between religion and politics in the history of these two major premodern Islamic Empires. Topics include notions of religion, sects, and state in Islam; the place of messianism and the ghaza ("holy war") ideology in the rise of the Ottoman and Safavid empires; the Sunni Ottoman-Shi'i Safavid conflict; sources of imperial legitimacy; the religious elite and the state; oppositional or revivalist religious movements and their accommodation and/or repression by the state; and the treatment of non-Muslims. Attention will also be paid to how growing Western hegemony and missionary activism in the region affected state policies vis-à-vis the sectarian minorities and the non-Muslims.

[NES 4605 Contesting Identities in Modern Egypt (also HIST 4091) @ (HA-AS)]

Fall. 4 credits. Next offered 2010-2011.
Z. Fahmy.]

NES 4639 Readings in Arabic Historical Texts (also RELST 4639) @ # (HA-AS)

Spring. 4 credits. D. Powers.
This class will introduce students to Arabic historical texts. The topic for this year's seminar will be the Arab conquests. Review of grammar, syntax, and vocabulary. Prerequisite: Reading knowledge of Arabic.

[NES 4642 Women in the Modern Middle East (also FGSS 4640, HIST 4642)]

Spring. 4 credits. Next offered 2010-2011.
Z. Fahmy.]

[NES 4644 Late Bronze Age World of Ugarit (also ARKEO/HIST/JWST 4644/6644, CLASS 4744/7744, NES 6644) @]

Spring. 4 credits. Next offered 2010-2011.
C. Monroe.]

NES 4666 Mass Media and Identities in the Modern Middle East (also HIST 4666)

Fall. 4 credits. Z. Fahmy.
This reading seminar will explore the expansion and influence of mass media in the Middle East from the late 19th to the turn of the 21st century. We will examine how the intersection of popular music, theater, poetry, film, and satellite television shaped culture, ideology, and identities in the modern Middle East. Topics we will consider include contested media representations of "modernity," gender, and evolving cultural, religious, national, and transnational identities. Although this seminar focuses upon the Middle East, it aims to locate the region within a larger global context.

[NES 4670 Wealth and Power in Early Civilizations (also JWST 4670) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010-2011.
C. Monroe.]

[NES 4672 Nationalism(s) and Nation-States in the Arab World]

Spring. 4 credits. Next offered 2010-2011.
Z. Fahmy.]

NES 4727 New York, Paris, Baghdad: Poetry of the City (also COML 4600/6870, NES 6727)

Spring. 4 credits. S. M. Toorawa.
The City is a recurrent theme and focus in much poetry, especially poetry of the modernists. We will read these poets to discover how they write the City, how they read it, and how other poets have responded. We will accompany Adonis, Baudelaire, Bayati, Cavafy, Lorca, Sayyab, Whitman (and others) to New York, Paris, Baghdad, Alexandria, Beirut, Cordoba (and elsewhere). All readings in translation, but we will use bilingual editions. Weekly thought essays, and a final paper.

[NES 4731 Topics in Islamic Art: The Almoravids, the Almohads, and the "Sunni Revival" (also ARTH 4331/6331, NES 6731) @ # (HA-AS)]

Fall. 4 credits. Next offered 2010-2011.
C. Robinson.]

NES 4738 Imagining the Mediterranean (also COML 4960, JWST 4738) @ (LA-AS)

Spring. 4 credits. G. Holst-Warhaft.
Through a series of readings in poetry and prose from Greece, Spain, Morocco, Turkey, Israel and Egypt, the course examines how Mediterranean writers interact with the sensuous aesthetics of landscape, music, and ritual in the Mediterranean. We will be concerned with how poetry, music, dance and image interact in the region, and how this relationship is reflected in 20th-century literature from and about the Mediterranean. The readings will focus on particular cases, such as the relationship of Lorca's poetry to the of Andalusia, lowbrow musical form in Greece, and the nostalgia for the mythical city

of Alexandria in Cavafy and other Alexandrian authors. We will also consider how the myth of the Mediterranean has affected modern literary imagination within and beyond the region.

NES 4784 Israeli Nation: Self and Literature (also JWST 4784)

Spring. 4 credits. D. Starr.

In this course we will read a selection of works by Israeli authors written after the establishment of the state in 1948. We will focus in particular on the formation of national identity as it has been shaped and reshaped through literary works. Even from the earliest years of the state there were sites of resistance against the pressure to conform. Some of the texts we read explore these tensions between the self and nation, while others explore alternate collective identities within or beyond the confines of the nation and the state. Among the authors we may read are: Orly Castel-Bloom, Sami Mikhail, Amos Oz, Ya'akov Shabtai, Anton Shammas, A. B. Yehoshua. All works will be read in English translation. No knowledge of Hebrew is required.

NES 4874 States and Societies in the Middle East (also GOVT 4374/6474, NES 6874)

Spring. 4 credits. D. Patel.

For description, see GOVT 4374.

[NES 4903 Methods in the Study of the Ancient Near East (also ARKEO 4903, JWST 4903) @

Spring. 4 credits. Limited to 15 students.

Next offered 2010–2011. D. I. Owen.

This seminar will focus on the reconstruction of the early history and culture of the ancient Near East that was made possible by combining the results of extensive archaeological discovery with the decipherment of the cuneiform languages of Syro-Mesopotamia and Anatolia and the hieroglyphic script of Egypt. The course will examine specific examples in the history of various countries of the Near East (Iraq, Syria, Turkey, Egypt and Israel) in order to explain the methodological similarities and differences utilized by scholars in each of these areas. Selected readings in anthropological, archaeological, philological, historical and literary sources will be augmented by audio-visual materials to provide a comparative perspective on the various approaches to the study of the ancient Near East.]

NES 4914 Liminality in Maritime Archaeology (also HIST/SHUM 4814)

Fall. 4 credits. C. Monroe.

For description, see SHUM 4814.

NES 4916 Crossing Oceans of Time (also SHUM 4816, HIST 4816)

Fall. 4 credits. M. Aymes.

For description, see SHUM 4816.

NES 4923 Secular Disaffections: On Islam and the Politics of Emotion (also COML 4066, RELST/SHUM 4823)

Fall. 4 credits. R. Mas.

For description, see SHUM 4823.

NES 4953 Islamism (also GOVT 4665)

Fall. 4 credits. S. Buck-Morss.

For description, see GOVT 4665.

NES 4991–4992 Independent Study, Undergraduate Level

Fall and spring. Variable credit.

Prerequisite: permission of instructor. Staff.

NES 4998–4999 Independent Study, Honors

Fall and spring. 8 credits. Prerequisite:

permission of instructor. Staff.

[NES 6112 Readings in Medieval Hebrew Poetry and Prose (also JWST 6112)

Fall. 4 credits. Next offered 2010–2011.

R. Brann.]

NES 6642 Topics in Ancient History (also CLASS 7682, HIST 6300, JWST 6642)

Spring. 4 credits. E. Rebillard.

For description, see CLASS 7682.

NES 6723 The Arabian Nights: Then and Now (also COML 3723/6723, NES 3723)

Fall. 4 credits. No prerequisites.

S. M. Toorawa.

The medieval Arabic cycle of stories known as *The Arabian Nights* or *The Thousand and One Nights* is a classic of world literature. In the first half of the course we will read the Nights and discuss both its dominant themes—deceit, love, sex, revenge, violence, and justice—and its storytelling contexts and antecedents (e.g., the Sanskrit *Jataka Tales*, and the Middle Persian *Tales of Bidpai*). And in the second half we will explore the ways in which its themes and tales have been adapted and appropriated by authors such as Jan Potocki in Polish, Edgar Allan Poe and John Barth in English, Jorge Luis Borges in Spanish, and Naguib Mahfouz in Arabic itself. All material is in English translation.

NES 6727 New York, Paris, Baghdad: Poetry of the City (also COML 4600/6870, NES 4272)

Spring. 4 credits. S. M. Toorawa.

The City is a recurrent theme and focus in much poetry, especially poetry of the modernists. We will read these poets to discover how they write the City, how they read it, and how other poets have responded. We will accompany Adonis, Baudelaire, Bayati, Cavafy, Lorca, Sayyab, Whitman (and others) to New York, Paris, Baghdad, Alexandria, Beirut, Cordoba (and elsewhere). All readings in translation, but we will use bilingual editions. Weekly thought essays, and a final paper.

NES 6874 States and Societies in the Middle East (also GOVT 4374/6474, NES 4874)

Spring. 4 credits. D. Patel.

For description, see GOVT 4374.

NES 6991–6992 Independent Study: Graduate Level

Fall and spring. Variable credit.

Prerequisite: permission of instructor. Staff.

NES 7633 Gender in Late Antiquity (also CLASS/HIST/RELST 7633, FGSS 7630)

Fall. 4 credits. K. Haines-Eitzen and

K. Bowes.

For description, see CLASS 7633.

NES 7979 Water and Culture in the Mediterranean: a Crisis? (also BEE 7540, LAW 7792)

Spring. 4 credits. G. Holst-Warhaft,

K. Porter, and T. Steenhuis.

For description, see BEE 7540.

NEPALI

See “Department of Asian Studies.”

PALI

See “Department of Asian Studies.”

PHILOSOPHY

S. MacDonald, chair, K. Bennett, R. Boyd, T. Brennan, C. Brittain, A. Chignell, M. Eklund, G. Fine, H. Hodes, M. Kosch, R. Miller, D. Pereboom, N. Sethi, N. Silins, N. Sturgeon, E. Taylor. Emeritus: C. A. Ginet, T. Irwin, S. Shoemaker.

The study of philosophy provides students with an opportunity to become familiar with some of the ideas and texts in the history of thought while developing analytical skills that are valuable in practical as well as academic affairs. It affords the excitement and satisfaction that come from understanding and working toward solutions of intellectual problems. The curriculum includes offerings in the history of philosophy, logic, philosophy of science, ethics, social and political philosophy, metaphysics, and theory of knowledge. Any philosophy course numbered in the 1000s or 2000s is suitable for beginning study in the field. Sections of PHIL 1100, 1120, and 1130 are part of the first-year writing seminar program; they are taught by various members of the staff on a variety of philosophical topics, and because of their small size (17 students at most) they provide ample opportunity for discussion. Students who want a broad introduction to philosophy may take PHIL 1100, but many students with special interests may find that the best introduction to philosophy is a 2000-level course in some particular area of philosophy; such courses have no prerequisites and are usually open to first-year students.

The Major

Students expecting to major in philosophy should begin their study of it in their freshman or sophomore year. Admission to the major is granted by the director of undergraduate studies of the department on the basis of a student's work during the first two years. Normally the student must have completed two philosophy courses with grades of B or better. Eight philosophy courses, taken for a letter grade, are required for the major. They must include at least one course on ancient philosophy (PHIL 2200, or a course with a large component on Plato or Aristotle), at least one course on classical modern metaphysics and epistemology from Descartes through Kant (e.g., PHIL 2220 or a course on the empiricists, the rationalists, or Kant), and a minimum of three courses numbered above 3000. Students admitted to the major are required to take a minimum of six philosophy courses numbered above 2000, and may not count more than one section of PHIL 1110, 1120, or 1130 toward the major. Courses numbered in the 1900s, 2900s, and 3900s do not count toward the major. A course in formal logic (e.g., PHIL 2310), while not required, is especially recommended for majors or prospective majors.

Philosophy majors must also complete at least 8 credits of course work in related subjects approved by their major advisors.

Occasionally majors may serve as teaching or research aides, working with faculty members familiar with their work.

Honors. A candidate for honors in philosophy must be a philosophy major with an average of B- or better for all work in the College of Arts and Sciences and an average of B+ or better for all work in philosophy. In either or both semesters of the senior year a candidate for honors enrolls in PHIL 4900/4901 and undertakes research leading to the writing of an honors essay by the end of the final semester. *Honors students normally need to take PHIL 4900/4901 both semesters of their senior year to write a satisfactory honors essay.* PHIL 4900/4901 does *not* count toward the eight philosophy courses required for the major. Prospective candidates should apply at the Department of Philosophy office, 218 Goldwin Smith Hall.

Fees

In some courses a small fee may be charged for photocopying materials to be handed out to students.

Introductory Courses

First-Year Writing Seminars in Philosophy

Fall and spring, 3 credits. Consult John S. Knight Institute brochure for times, instructors, and descriptions.

PHIL 1100 Introduction to Philosophy # (KCM-AS)

Fall and spring, 3 credits. Fall, N. Silins; spring, K. Bennett.

A general introduction to some of the main topics, texts, and methods of philosophy. Topics may include the existence of God, the nature of mind and its relation to the body, causation, free will, knowledge skepticism, and justice and moral obligation. Readings may be drawn from the history of philosophy and contemporary philosophical literature.

PHIL 1421 Law, Science, and Society

Spring, 3 credits. M. Fedyk.

Science and law each play an influential and important role in contemporary society. Part of the reason for this is that it is widely believed that both institutions have the special authority to provide answers to many socially important questions. This course will be structured around a philosophical investigation into the sources of the authority of law and science, and a more general consideration of the various ways in which their twin influences are able to shape aspects of our lives.

PHIL 1450 Contemporary Moral Issues (KCM-AS)

Fall, summer, 3 credits. Fall, E. Taylor; summer, N. Sethi.

An introduction to some of the main contemporary moral issues. Topics may for example include animal rights, abortion, euthanasia, capital punishment, sexual morality, genetic engineering, and questions of welfare and social justice.

PHIL 1500 Philosophy of Everyday Life (KCM-AS)

Fall, 3 credits. K. Bennett.

People sometimes think that philosophy is dry and abstract. It needn't be. This course involves thinking philosophically—i.e., clearly, carefully, and with arguments—about a variety of everyday issues regarding how we live our lives and face our deaths. Questions that might be addressed include the following:

What should we eat? Whom should we befriend or love? How should we love—for example, should we assume that all good romantic relationships are monogamous? How should we spend our leisure time? Does the Internet pose new ethical problems? What, if anything, is wrong with athletes taking steroids? How should we think about ourselves and our loved ones in the face of illness, disability, aging, and death? What can Alzheimer's tell us about the nature of personhood? Does life have any "meaning"—whatever that means?

PHIL 1512 Philosophy and Film (also FILM 1512) (KCM-AS)

Summer, 3 credits. C. Maguidhir.

This course uses film to examine and highlight fundamental problems in philosophy as well as pay special attention to philosophical issues in the medium of film. Philosophical topics covered may include artificial intelligence, personal identity, free will, skepticism, philosophy of time, the problem of evil, film and emotion, and film and art.

PHIL 1810 Introduction to the Philosophy of Science (KCM-AS)

Summer, 3 credits. N. Sethi.

Philosophy of Science introduces the philosophical study of problems that arise from the practice of science. Our focus will be on such topics as scientific objectivity, scientific explanation, the role of values in the sciences, the nature of scientific observation and reasoning. We will also attempt to apply philosophical analysis to controversies that involve science and society.

PHIL 1910 Introduction to Cognitive Science (also COGST 1101, CS 1710, LING 1170, PSYCH 1102) (KCM-AS)

Fall, summer, 4 credits. M. Spivey.

For description, see COGST 1101.

PHIL 2200 Ancient Philosophy (also CLASS 2661) # (KCM-AS)

Fall, 4 credits. T. Brennan.

An introductory survey of ancient Greek philosophy from the so-called Presocratics (6th century BCE) through the Hellenistic period (1st century BCE) with special emphasis on the thought of Socrates, Plato, and Aristotle.

PHIL 2220 Modern Philosophy # (KCM-AS)

Spring, 4 credits. Best taken in conjunction with PHIL 2200 (Ancient Philosophy), although this is not a prerequisite. D. Pereboom.

A survey of Western philosophy in the 17th and 18th centuries: Descartes, Locke, Spinoza, Leibniz, Berkeley, Hume, and Kant. We focus largely on epistemology (ideas, skepticism, belief, knowledge, science) and metaphysics (bodies, minds, God, causation, natural laws, afterlife, personal identity). Some of the ethical implications of these systems will also be mentioned in passing.

PHIL 2240 19th- and 20th-Century European Thought (KCM-AS)

Spring, 4 credits. M. Kosch.

A survey of European philosophy of the 19th and 20th centuries. Figures may include Hegel, Marx, Kierkegaard, Nietzsche, Husserl, Heidegger, Horkheimer, Adorno, Habermas, and Foucault.

PHIL 2300 Puzzles and Paradoxes (KCM-AS)

Fall, 4 credits. M. Eklund.

The course provides an overview of a number of famous philosophical puzzles and paradoxes and important attempts to solve them. Among the paradoxes that may be discussed are Zeno's paradoxes of space, time and motion, the paradox of the heap, the liar paradox, Russell's set-theoretic paradox, and various paradoxes concerning knowledge and rationality.

PHIL 2310 Introduction to Deductive Logic (MQR)

Spring, 4 credits. H. Hodes.

Sentential languages, the truth-functional connectives, and their logic; first-order languages, the quantifiers "every" and "some," and their logic.

PHIL 2410 Ethics (KCM-AS)

Spring, 4 credits. F. Taylor.

An introduction to the philosophical study of ethical reasoning and ethical theories. Topics may include ethical skepticism, ethical relativism and ethical objectivity; ethical egoism, utilitarianism, deontological theories and virtue ethics. Readings may be drawn from contemporary debates as well as from the long history of philosophical writing about ethics.

PHIL 2420 Social and Political Philosophy (also GOVT 2605) (KCM-AS)

Spring, 4 credits. E. Taylor.

This course will examine key issues in social and political philosophy. Topics may include the legitimacy of the state; political obligation; the nature and demands of justice; equality; liberty and autonomy. Selected readings may be drawn from historical as well as contemporary sources.

PHIL 2450 Ethics and Health Care (KCM-AS)

Spring, 4 credits. N. Sethi.

An introduction to the philosophical study of ethical problems that arise from the practice of medicine as such or that arise in response to developments within medicine and the larger world.

PHIL 2460 Ethics and the Environment (also BSOC/STS 2061) (KCM-AS)

Spring, 4 credits. Limited to 40 students.

Open to all undergraduates; freshmen by permission of instructor. S. Pritchard. For description, see BSOC 2061.

PHIL 2490 Feminism and Philosophy (also FGSS 2490) (KCM-AS)

Fall, 4 credits. N. Sethi.

This class will explore and examine feminist re-reading of some key issues in traditional philosophy. Our focus will be on the role of gender in the construction of philosophical problems and concepts as well as on the various ways in which traditional philosophy reflects bias against women. Topics include feminist theories of knowledge and science, ethics, law and political theory.

PHIL 2530 Religion and Reason (also RELST 2630) (KCM-AS)

Spring, 4 credits. S. MacDonald.

An introduction to some of the main issues in philosophy of religion. Topics may include the existence and nature of God, the problem of evil, the nature of faith, and the epistemology of religious belief. Readings are drawn from the history of philosophy and contemporary philosophical debates.

PHIL 2620 Introduction to Philosophy of Mind (KCM-AS)

Spring, 4 credits. N. Silins.

An introduction to some of the central issues in philosophy of mind. Questions to be addressed may include: What is the relation between the mind and the body? How can consciousness fit into our picture of the physical world? What is the difference between a reflex and an intentional action? Readings are typically drawn from recent sources.

PHIL 2640 Introduction to Metaphysics (KCM-AS)

Fall, 4 credits. K. Bennett.

This course is an introduction to some of the central questions in metaphysics—the study of what there is and how it works. Possible topics include persistence through change, freedom of the will, the nature of time (and the possibility of time travel), causation, properties, and necessity.

PHIL 2860 Science and Human Nature (also STS 2861) (KCM-AS)

Spring, 4 credits. R. Boyd.

An examination of attempts in the biological and social sciences to offer scientific theories of human nature and human potential and to apply such theories to explain important social and psychological phenomena.

Intermediate or Advanced Courses

Some of these courses have prerequisites.

PHIL 3202 Plato (also CLASS 3669) # (KCM-AS)

Fall, 4 credits. Prerequisites: at least one previous course in philosophy at 2000 level or above; or permission of instructor. G. Fine.

We will study several of Plato's major dialogues, including the *Apology*, the *Meno*, *Phaedo*, and *Republic*. Topics include knowledge and reality; morality and happiness; the nature of the soul.

PHIL 3204 Hellenistic Philosophy # (KCM-AS)

Spring, 4 credits. Prerequisites: at least one previous course in philosophy at 2000 level or above or permission of instructor. T. Brennan.

We will study the doctrines and theories of the Epicurean, Stoic, and Skeptical Schools that flourished in the period after the death of Aristotle. This period saw extensive new developments in logic, metaphysics, epistemology, and ethics. The rediscovery of Hellenistic Philosophy in the Renaissance led to the rejection of Medieval Aristotelianism and the birth of early modern philosophy.

PHIL 3220 Modern Rationalism

Spring, 4 credits. Prerequisite: One PHIL course, preferably 2220, 3221, or an equivalent. A. Chignell.

A mid-level look at the epistemology and metaphysics of the classical Continental rationalists. Topics typically include: ideas, skepticism, belief, knowledge, science, bodies, minds, God, causation, natural laws, afterlife, personal identity. Readings from some (but not all) of the following: Descartes, Malebranche, Spinoza, Leibniz, Wolff, the early Kant.

PHIL 3260 Origins of Analytic Philosophy

Spring, 4 credits. Prerequisite: two previous philosophy courses or permission of instructor. M. Eklund.

An overview of some important authors and themes from the early years of analytic

philosophy (from the late 19th century through the early 20th century). Authors discussed may include Gottlob Frege, Bertrand Russell, G. E. Moore and the early Ludwig Wittgenstein.

PHIL 3310 Deductive Logic (also MATH 2810) (MQR)

Fall, 4 credits. Prerequisite: PHIL 2310 or permission of instructor. H. Hodes.

A mathematical study of the formal languages of propositional and predicate logic, including their syntax, semantics, and deductive systems. Various formal results will be established, most importantly soundness and completeness.

PHIL 3410 Ethical Theory (KCM-AS)

Fall, 4 credits. N. Sturgeon.

Topic: Consequentialism and Its Critics. This course will examine one of the deepest divides in modern philosophical debates about ethics, between those who think the moral evaluation of acts, character traits, and social institutions ultimately depends solely on their good or bad consequences, and critics who find this approach fundamentally misguided.

PHIL 3460 Modern Political Philosophy (also GOVT 3625) (KCM-AS)

Fall, 4 credits. R. Miller.

This course will primarily focus on studying and scrutinizing general conceptions of justice. Topics explored typically include liberty, economic equality, democracy, community, the general welfare, and toleration. We will also look at implications for particular political controversies such as abortion, welfare programs, and pornography.

PHIL 3700 Problems in Semantics (also COGST 3300, LING 3333) (KCM-AS)

Fall, 4 credits. D. Abusch.

For description, see LING 3333.

PHIL 3810 Philosophy of Science (also STS 3811) (KCM-AS)

Fall, 4 credits. R. Boyd.

This course will cover various topics in the philosophy of science.

PHIL 3900 Independent Study

Fall or spring. Variable credit.

To be taken only in exceptional circumstances. Must be arranged by the student with his or her advisor and the faculty member who has agreed to direct the study.

Advanced Courses and Seminars

These courses are offered primarily for majors and graduate students.

PHIL 4002 Latin Philosophical Texts (also RELST 4100)

Fall and spring. Variable credit. C. Brittain and S. MacDonald.

Reading and translation of Latin philosophical texts.

PHIL 4003 German Philosophical Texts

Fall and spring, 4 credits. Prerequisites: basic reading (not necessarily speaking) knowledge of German and permission of instructor. Open to upper-level undergraduates. M. Kosch.

Reading, translation, and English-language discussion of important texts in the German philosophical tradition. Readings for a given term are chosen in consultation with students.

PHIL 4200 Topics in Ancient Philosophy # (KCM-AS)

Fall and spring, 4 credits. Fall, G. Fine; spring, T. Brennan.

Advanced discussion of topics in ancient philosophy.

PHIL 4220 Modern Philosophy # (KCM-AS)

Spring, 4 credits. M. Kosch.

Advanced discussion of topics or authors in "modern" Western philosophy (roughly the 17th and 18th centuries). Topic for 2010: Kierkegaard.

PHIL 4311 Topics in Logic (MQR)

Spring, 4 credits. H. Hodes.

This course will focus on intuitionistic logic, including (1) its relationships to classical logic, some "intermediate logics" between intuitionistic and classical, and a modal logic. We'll consider (2) both proof-theoretic and model-theoretic characterizations of the consequence relations for these logics, (3) algebraic/topological (and time permitting, categorical) characterizations of intuitionistic consequence. (4) We'll also look at how certain mathematical theories have been developed on the basis of intuitionistic logic.

PHIL 4410 Topics in Contemporary Ethical Theory (KCM-AS)

Fall, 4 credits. N. Sturgeon.

A course for philosophy graduate students and advanced undergraduates on some selected range of topics in contemporary normative or philosophical ethics. Fall 2009 topic: Moral Realism.

PHIL 4460 Topics in Political Philosophy (KCM-AS)

Fall, 4 credits. E. Taylor.

Advanced discussion of topics in political philosophy. Topic for 2009: Consent.

PHIL 4471 Normative Issues in International Relations

Fall, 4 credits. R. Miller.

An investigation of normative aspects of international affairs, examining moral principles, specific cases, and proposals for reform. Topics may include the ethics of war, global poverty and global economic justice, fairness and democracy in multinational institutions, forms of transnational domination and their moral significance, human rights regimes, equity and adequacy in containing climate change.

PHIL 4620 Topic in Philosophy of Mind (KCM-AS)

Spring, 4 credits. N. Silins.

Advanced discussion of a topic in philosophy of mind. Topic for 2010: Self Knowledge

PHIL 4810 Problems in the Philosophy of Science (also STS 4811) (KCM-AS)

Spring, 4 credits. R. Boyd and A. Chignell. Advanced discussion of some problem or problems in the Philosophy of Science. Topic: Neo-Kantian/Hegelian Analytic Philosophy.

PHIL 4900 Informal Study for Honors

Fall and spring, 4 credits. Prerequisite: senior honors students.

See "Honors" at the beginning of the Philosophy section.

PHIL 6020 Latin Philosophical Texts (also LATIN 7262, RELST 6020)

Fall and spring. Variable credit.

Prerequisites: knowledge of Latin and permission of instructor. S. MacDonald and C. Brittain.

Reading and translation of Latin philosophical texts.

PHIL 6030 German Philosophical Texts (also GERST 6131)

Fall and spring. Variable credit. Open to upper-level undergraduates. Prerequisite: basic reading (not necessarily speaking) knowledge of German. M. Kosch.

Reading, translation, and English-language discussion of important texts in the German philosophical tradition. Readings for a given term are chosen in consultation with students.

PHIL 6200 Seminar in Ancient Philosophy (also CLASS 7173)

Fall. 4 credits. G. Fine.

Graduate seminar covering a topic in ancient philosophy.

PHIL 6201 Graduate Seminar in Latin (also CLASS 7271)

Fall. 4 credits. C. Brittain.

For description, see CLASS 7271.

PHIL 6210 Seminar in Medieval Philosophy

Fall. 4 credits. S. MacDonald.

Graduate seminar covering a topic in medieval philosophy.

PHIL 6410 Seminar in Ethics and Value Theory

Fall. 4 credits. M. Kosch.

Graduate seminar covering a topic in ethics and value theory.

PHIL 6470 Seminar on Normative Issues in International Relations

Spring. 4 credits. R. Miller.

For description, see PHIL 4471.

PHIL 6610 Seminar in Epistemology

Spring. 4 credits. N. Silins.

Graduate seminar covering a topic in epistemology.

PHIL 6640 Seminar in Metaphysics

Spring. 4 credits. K. Bennett.

Graduate seminar covering a topic in metaphysics.

PHIL 6710 Seminar in Philosophy of Language (also LING 6634)

Fall. 4 credits. M. Eklund.

Graduate seminar covering a topic in philosophy of language.

PHIL 6810 Seminar in Philosophy of Science (also STS 6811)

Spring. 4 credits. R. Boyd and A. Chignell.

Graduate seminar covering a topic in philosophy of science. Topic for spring 2010: Neo-Kantian/Hegelian Analytic Philosophy.

PHYSICS

J. R. Patterson, chair (109 Clark Hall, 255-6016); E. Mueller, director of undergraduate studies (115 Clark Hall, 255-8158, physicsdus@mailbox@cornell.edu); J. P. Alexander, T. A. Arias, I. Bazarov, E. Bodenschatz, P. Brouwer, D. G. Cassel, E. Cassel, I. Cohen, C. Csaki, J. C. Davis, G. F. Dugan, V. Elser, E. Flanagan, C. P. Franck, R. Fulbright, R. S. Galik, A. Giambattista, L. K. Gibbons, P. Ginsparg, B. Greene, Y. Grossman, S. M. Gruner, D. L. Hartill, C. L. Henley, G. Hoffstaetter, E.-A. Kim, P. Krasicky, M. Lawler, A. LeClair, G. P. Lepage, M. U. Liepe, L. McAllister, P. L. McEuen, M. Neubert, Y. Orlov, H. Padamsee, J. M. Parpia, M. Perelstein, D. C. Ralph, B. Richardson, R. C. Richardson, D. L. Rubin, A. Ryd, K. Schwab, K. Selby, J. P. Sethna, K. M. Shen, A. J. Sievers, E. Siggia, S. A. Teukolsky, J. Thom, R. Thorne, H. Tye, C. Umrigar, M. Vengalattore, M. D. Wang, I. Wasserman, P. Wittich, T.-M. Yan

The concepts and methods of physics have an impact on nearly all areas of human endeavor. Thus, the Department of Physics offers courses in physics for the entire Cornell community. There are general education courses for non-scientists, well-designed introductory sequences for science and engineering majors, more advanced courses for physics majors, and rigorous programs of graduate study, up to doctoral-level independent research.

Undergraduate and graduate students benefit from outstanding faculty and world-class research facilities in the Laboratory of Atomic and Solid State Physics (LASSP) and the Laboratory of Elementary Particle Physics (LEPP). Physics faculty and students conduct research in condensed-matter physics, nanophysics, biophysics, atomic physics, X-ray physics, high-energy particle physics, accelerator physics and astrophysics. Students are invited to attend weekly research seminars and colloquia that showcase the work of the national and international physics communities. Undergraduates are encouraged to participate in research, and many find summer employment within the department. For more information, visit www.physics.cornell.edu/undergraduate.

Courses for Non-Physics Majors

- PHYS 1101-1102 is a self-paced auto-tutorial course sequence designed for students who recognize the need for a basic understanding of physics, but who do not have preparation in calculus and who do not intend to take further physics courses.
- PHYS 2207-2208 and 1112-2213-2214 are introductory physics courses for students who want a solid grounding in physics and a chance to develop their calculus-based problem solving skills. Non-majors considering more advanced work in physics are encouraged to take 1112-2213-2214 or 2207-2213-2214.
- Courses beyond the introductory level that may be of interest to non-majors include PHYS 3316 Modern Physics I, PHYS 3330 Modern Experimental Optics, and PHYS 3360 Electronic Circuits.
- General education courses currently include PHYS 1201, Why the Sky is Blue: Aspects of the Physical World, PHYS 1203,

Physics of the Heavens and Earth, and PHYS 1204, The Physics of Musical Sound.

Students may obtain advanced placement and credit, as outlined in "Advanced Placement of Freshmen," and transfer credit for physics courses taken elsewhere. Students seeking transfer credit or advice on the use of AP credit should consult the Physics director of undergraduate studies.

The Physics Major: Two Routes to a Promising Future

The analytical and problem solving skills and the fundamental conceptual and practical understanding of how the world works provided by an education in physics have allowed physics majors to pursue careers—and have major impacts—not just in physics, but in engineering, education, medicine and the life sciences, the military services, computer and information sciences, earth and environmental sciences, law, finance and economics, management consulting, philosophy of science, forensics and public policy. Reflecting this breadth of opportunity, the Physics Department offers two approaches to the major:

1. The **concentration within physics** is the principal path to professional or graduate work in physics and closely related fields, and is also the best choice for students who wish to obtain maximum benefit from rigorous studies in physics. The inside concentration consists of the core physics courses plus electives taken within the Physics Department.
2. The **concentration outside physics** provides more flexibility for those want to develop skills in physics but whose career interests lie elsewhere. For example, a pre-medical or biophysics student may concentrate in biology; a pre-law student may concentrate in business, history, or public policy; and a student planning graduate work in econometrics or on pursuing an M.B.A. may concentrate in economics. Students interested in education careers (and in capitalizing on the critical national shortage of high school physics teachers) may concentrate in education, allowing them to complete a masters degree in Physics Education with New York State Teacher certification in one additional year at Cornell.

Physics majors—especially those concentrating within physics—are advised to start the introductory physics sequence in the first semester of their freshman year, as a delayed start reduces flexibility in future course scheduling. Students who switch to the physics major after taking introductory physics in their sophomore year can usually still complete an outside concentration. Acceptance into the major program is normally granted upon completion of a year of physics and mathematics courses at Cornell with all course grades at the B- level or higher. Grades of at least C- (or S for S-U only courses) are required in all courses counting toward the physics major.

Advising

Prospective majors are urged to meet with the Physics Director of Undergraduate Studies for advice on advanced placement credit and on program planning. Based on their specific

interests, students will be matched by the DUS with a major advisor. The student and major advisor will then work out the details of the major course program.

Courses for Physics Majors

The Physics Core—All physics majors must complete a core of physics and mathematics courses, as follows:

- A three-semester introductory physics sequence, either PHYS 1112–2213–2214, or its more analytic “honors” version 1116–2217–2218. PHYS 2207 students with life/chemical/health science interests who decide to switch to the physics major may complete 2207–2213–2214. A transition from 2208 to 2214 is also possible for students with very strong math backgrounds.
- Mathematics courses covering single and multivariable calculus, linear algebra, series representations, and complex analysis: MATH 1910 or 1120; 1920 or 2210; 2930 or 2220; and 2940 or 2210; or their equivalents. Inside concentrators should complete at least one additional year of applicable mathematics such as AEP 3210 and 3220.
- Five upper-level courses beyond the three-semester introductory sequence, consisting of: (1) the two-course sequence in modern physics (PHYS 3316–3317), (2) at least three semester hours of laboratory work selected from PHYS 3310, 3330, 3360, 4410, or ASTRO 4410, (3) an intermediate course in classical mechanics (PHYS 3314 or 3318), and (4) an intermediate course in electromagnetism (PHYS 3323 or 3327). Students who complete the 1112–2213–2214 or 2207–2213–2214 introductory sequence are advised to complete the 1-credit course PHYS 2216 before taking PHYS 3316.

In addition to the core, each physics major must complete at least 15 semester hours of credit in an area of concentration that has been agreed upon by the student and major faculty advisor.

Concentration within Physics

Students planning professional or graduate work in physics are encouraged to take the more advanced and analytically rigorous versions of the core courses—PHYS 1116, 2217, 2218, 3318 and 3327. Students with weaker high school preparation may start in PHYS 1112 and then switch to the advanced sequence in later semesters. The best-prepared students, who may qualify for advanced placement credit for PHYS 1112 and/or 2213, are still strongly encouraged to start with 1116.

For a concentration within physics, the minimum 15 hours beyond the core must be composed of physics courses with numbers greater than 3000. These 15 hours must include the senior laboratory course PHYS 4410 in addition to one of the lab courses listed for the core, so that a physics concentration requires a minimum of 7 credit hours of laboratory work. The accompanying table shows some typical course sequences that fulfill the major requirements. The sequence followed by each student will depend upon his or her interests and pre-college preparation, and will be determined in consultation with the major advisor. Majors are

strongly encouraged to participate in the department’s research activities. If this activity is done as an independent project, PHYS 4490, up to 8 credit hours can be applied toward the concentration.

Concentration outside of Physics

For outside concentrations, the courses to be counted in the minimum 15 credit hours beyond the core must have internal coherence and lead to mastery in the area of concentration. The course sequence must be worked out with and approved by the major faculty advisor. At least 8 of the 15 credit hours must be in courses numbered above 3000. Past areas of concentration include astronomy, business, chemical physics, computer science, econometrics, education, geophysics, history, and philosophy of science, law, meteorology, and public policy. A combined biology/chemistry concentration is common for premedical students or those who wish to prepare for work in biophysics.

The department particularly wishes to encourage students with an interest in science education. Physics majors can obtain teaching certification by concentrating in education and then completing a one-year master of arts in teaching (M.A.T.) degree. Information about the education concentration and M.A.T. can be obtained from the Department of Education’s Cornell Teacher Education Program, from the physics department’s Teacher in Residence, or from the Physics director of undergraduate studies.

The core for students with outside concentrations may follow either PHYS 1112–2213–2214, 3314, and 3323, or the advanced 1116–2217–2218, 3318, and 3327. Students

concentrating in astronomy who might continue on to graduate school in that field are encouraged to take PHYS 3318 and 3327 in the core and ASTRO 4410, 4431, and 4432 toward the concentration.

Honors

A student may be granted honors in physics upon the recommendation of the Physics Advisors Committee of the physics faculty. There is no particular course structure or thesis requirement for honors.

Double Majors

Double majors including physics are possible and not at all uncommon. However, any course used to satisfy a requirement of another major may be used in satisfaction of physics major requirements only if the student’s concentration is within physics.

Courses with Overlapping Content

The grouped courses listed in the chart below have largely similar content. Students should select courses for their academic program carefully, as they may receive credit for only one course in each group.

- PHYS 1101, 1112, 1116, 2207
- PHYS 1102, 2208, 2213, 2217
- PHYS 2214, 2218
- PHYS 3314, 3318
- PHYS 3323, 3327
- PHYS 1116, 2216
- PHYS 2206, GOVT 3847

Typical Physics Course Sequences (other sequences are also possible)

Semester	Physics concentrators No AP math or physics	Physics concentrators 1 year AP calculus and good HS physics	Outside concentrators electives not indicated	Outside concentrators (alternate) electives not indicated
1st – Fall	1112	1116	1112	
2nd – Spring	2213	2217	2213	1112
3rd – Fall	2214, 2216	2218	2214, 2216	2213
4th – Spring	3316, 33x0	3316, 33x0	33x0	2214, 2216
5th – Fall	3317, 3323/3327, 33x0	3317, 3327, 33x0	3316	33x0, 3316
6th – Spring	3314/3318, 4443	3318, 4443	3314	3314, 3x0
7th – Fall	3341, 4410	3341, 4410	3317, 3323	3317, 3323
8th – Spring	Elective(s)	Elective(s)		

- For majors with concentrations outside physics, there is wide variation in individual programs, arranged to best match the field of concentration.
- Crossovers between the two sequences 1112–2213–2214 and 1116–2217–2218 are possible, although the combination 1112–2213–2218 is difficult. PHYS 2207 may be substituted for PHYS 1112. Students taking 2217 after 1112 must co-register for 2216.
- Students taking the honors sequence 1116–2217–2218 are strongly encouraged to start with PHYS 1116. Exceptionally well-prepared students may be able to begin work at Cornell with PHYS 2217. Such students should visit the Director of Undergraduate Studies for advice in planning a course program.
- Physics electives for the major include 3360, 4444, 4454, 4455, 4480, 4490, 6525, 6553, 6561, 6572, the senior seminars 4481–4489, ASTRO 3332 or 4431–4432, and AEP 4340.
- **One** semester of intermediate laboratory, listed here as 3x0, is required.
- Well-prepared sophomores wishing to take PHYS 3318 should consult the instructor before registering.
- Students interested in graduate work in physics immediately after Cornell are advised to begin the introductory physics sequence in their first semester.

In addition, students with credit for PHYS 1101, 1112, 1116, or 2207, or an advanced placement equivalent who wish to enroll in PHYS 1200-1206 must obtain written permission from the instructor and the Physics director of undergraduate studies.

Course Prerequisites

Achieving success in a physics course is easier if you have the proper preparation. Each physics course description lists prerequisite courses that develop mastery in the needed mathematics and physics. Students who wish to enroll in a course but lack the listed prerequisites can often succeed with an appropriate work plan, especially if they have other relevant prior experience. These students must discuss their preparation with the course instructor and with their advisor before enrolling.

Courses

PHYS 1012 PHYS 1112 Supplement

Spring. 1 credit. S-U grades only.
R. Lieberman.

Provides backup instruction for PHYS 1112. Recommended for students who either feel insecure about taking PHYS 1112 or simply want to develop their problem-solving skills. Emphasis is on getting the student to develop a deep understanding of basic concepts in mechanics. Much class time is spent solving problems and applications.

PHYS 1013 PHYS 2213 Supplement

Fall. 1 credit. S-U grades only.
R. Lieberman.

Provides backup instruction for PHYS 2213. Description is the same as for PHYS 1012, except the material covered is electricity and magnetism.

PHYS 1101 General Physics I (PBS)

Fall, summer (eight-week, six-week, or first four weeks only for those doing PHYS 1102 in the second four weeks). 4 credits. Enrollment may be limited and freshmen are excluded. General introductory physics for nonphysics majors. Prerequisites: three years high school mathematics, including some trigonometry. Students without high school physics should allow extra time for PHYS 1101. Includes less mathematical analysis than PHYS 2207 but more than PHYS 1200-1206, 1209, 1210. T. Arias.

Emphasizes quantitative and conceptual understanding of the topics of introductory physics developed without use of calculus. The course is mostly self-paced in a mastery-oriented format including eight subject units and a final retention (review) unit. Most instruction occurs in the learning center with personal tutoring by staff, assigned readings, problems, laboratory exercises, videotaped lectures, tutorials and solutions of sample test questions at our web site. Unit testing is designed to measure mastery with a limit of three test tries. Major topics for 1101: kinematics, forces and dynamics, momentum, energy, fluid mechanics, waves and sound, thermal physics, kinetic theory, and thermodynamics. At the level of *College Physics*, second ed., by Giambattista, Richardson, and Richardson.

PHYS 1102 General Physics II (PBS)

Spring, summer (eight-week, six-week, or second four weeks only for those doing PHYS 1101 in first four weeks). 4 credits. Enrollment may be limited. Prerequisite: for PHYS 1102, PHYS 1101 or 1112 or 2207. Includes less mathematical analysis than PHYS 2208 but more than PHYS 2200-2206, 2209, 2210. T. Arias.

Emphasizes quantitative and conceptual understanding of the topics of introductory physics developed without use of calculus. The course is mostly self-paced in a mastery-oriented format including eight subject units and a final retention (review) unit each semester. Most instruction occurs in the learning center with personal tutoring by staff, assigned readings, problems, laboratory exercises, videotaped lectures, tutorials, and solutions of sample test questions at the course web site. Unit testing is designed to measure mastery with a limit of three test tries. Major topics for 1102: electricity and magnetism, optics, relativity, quantum, nuclear, and particle physics. At the level of *College Physics*, second ed., by Giambattista, Richardson, and Richardson.

[PHYS 1103 General Physics (PBS)

Summer. 4 credits. Prerequisites: three years high school mathematics, including some trigonometry. Next offered 2010-2011.

General introductory physics for non-physics majors. Basic principles treated quantitatively but without calculus. Topics include kinematics; forces and Newton's Laws; momentum, and energy; thermal physics, fluid mechanics; sound and waves.]

PHYS 1112 Physics I: Mechanics (PBS)

Fall, spring, summer (six-week session). 4 credits. Primarily for engineering students and prospective physics majors. Prerequisite: MATH 1910 or 1120. Recommended: coregistration in MATH 1920. Fall, A. LeClair; spring, staff.

Covers the mechanics of particles with focus on kinematics, dynamics, conservation laws, central force fields, periodic motion. Mechanics of many-particle systems: center of mass, rotational mechanics of a rigid body, and static equilibrium. At the level of *University Physics*, Vol. 1, by Young and Freedman, 12th ed.

PHYS 1116 Physics I: Mechanics and Special Relativity (PBS)

Fall, spring, 4 credits. More analytic than PHYS 1112; intended for students who are comfortable with deeper, somewhat more abstract approach; intended mainly but not exclusively for prospective majors in physics, astronomy, or applied and engineering physics. Prerequisites: good secondary school physics course, proficiency with basic calculus, and enjoyment of puzzle-solving. Corrective transfers between PHYS 1116 and PHYS 1112 (in either direction) are encouraged during first three weeks of instruction. Fall, L. Gibbons; spring, K. Shen.

At the level of *An Introduction to Mechanics* by Kleppner and Kolenkow.

PHYS 1117 Concepts of Modern Physics

Fall. 1 credit. Enrollment may be limited. Corequisite: PHYS 1112 or 1116 or 2213 or 2217. For freshmen who plan to major in physics, applied and engineering physics, or astronomy. S-U grades only. A. Sadoff. Intended for freshmen who plan to major in physics or a closely related field (i.e., applied

and engineering physics or astronomy) and would like to learn about the concepts of modern physics early in their physics education. Possible topics of discussion are scientific methodology, symmetry and conservation laws, quantum theory, the unification of forces and matter in the Standard Model, and big-bang cosmology.

PHYS 1190 Supplemental Introductory Laboratory

Fall, spring. 1 credit. Times TBA with instructor. Limited enrollment. S-U grades only. Prerequisites: 3 transfer credits for introductory physics lecture material; a degree requirement for laboratory component of that introductory course; approval of director of undergraduate studies; and permission of lecturer of that course at Cornell. Students must file PHYS 1190 permission form in 121 Clark Hall with physics department course coordinator.

Students perform the laboratory component of one of the introductory courses (PHYS 1112, 2207, 2208, 2213, 2214) to complement the lecture-related course credit acquired elsewhere. Those wishing to take equivalent of one of these introductory courses at another institution should receive prior approval from the physics director of undergraduate studies.

PHYS 1201 Why the Sky Is Blue: Aspects of the Physical World (PBS)

Fall. 3 credits. A. Sadoff.

Descriptive physics course aimed specifically at the nonscience student. There is an emphasis on the ideas of modern physics where the approach is both historical and thematic. The methodology of science and the nature of evidence is emphasized. An overriding theme is the unification and character of physical laws as shown, for example, through the great principles of symmetry and conservation. While a few computational problems are assigned, the purpose is to help students to understand the concepts rather than to master problem-solving techniques.

PHYS 1202 How Physics Works (PBS)

Spring. 3 credits. Intended for nonphysics majors. No background in either science or mathematics beyond high school algebra assumed. Staff.

Introduces students who are not majoring in scientific or quantitative disciplines to the techniques and ways of reasoning employed in physics. By gaining an understanding of two milestones in the history of physics (the discoveries of Newton and the application of the laws of laws of probability to physical problems), students learn about the interaction of experiment, mathematics, and conjecture that has fueled the advance of physics.

PHYS 1203 Physics of the Heavens and the Earth—A Synthesis (PBS)

Spring. 3 credits. Prerequisite: none; uses high school algebra and geometry. For nonscience majors. H. Padamsee.

Shows how the unification of apparently distinct areas of physics leads to an explosion in the growth of our knowledge and understanding. The material is divided into three parts: the physics of motion on earth; motion in the heavens; and synthesis. Trace how ideas about celestial and terrestrial motion evolved separately at first, from the ancient ideas of Greek philosophers to the dynamics and telescopic discoveries of Galileo during the Renaissance. The two arenas finally

melled under Newton's Universal Gravitation. Einstein's special and general theories of relativity eventually supplanted Newton's ideas. There is an emphasis throughout on "how do we know the laws?" These are the stories of breakthrough discoveries and brilliant insights made by fascinating people, offering a humanistic perspective.

PHYS 1204 Physics of Musical Sound (also MUSIC 1466) (PBS)

Spring, 3 credits. Open to all students and suitable for nonscientists; does not serve as prerequisite for further science courses.

Assumes no scientific background but uses high school algebra. K. Selby.

Explores musical sound from a physics point of view. Topics include: how various musical instruments work; pitch, timbre, scales, intervals and tunings; hearing; room acoustics; reproduction of sound. Science writing and physics problem-solving skills are developed through weekly assignments. Student activities include hands-on investigations of musical instruments, and field trips. Students write a term paper investigating a topic of their choice. At the level of *The Science of Sound* by Rossing, Moore, and Wheeler.

PHYS 2206 Weapons of Mass Destruction (also GOVT 3847) @

Spring, 4 credits. *Students enrolled in PHYS 2206 receive PBA-AS; students enrolled in GOVT 3847 receive SBA-AS.* Kreps and G. Lewis.

For description, see GOVT 3847.

PHYS 2207 Fundamentals of Physics I (PBS)

Fall, 4 credits. Prerequisites: high school physics plus MATH 1110 or 1106, or solid grasp of basic notions of introductory calculus. M. Liepe.

PHYS 2207–2208 is a two-semester introduction to physics with emphasis on tools generally applicable in sciences, intended for students majoring in physical science, mathematics, or analytically oriented biological science. The combination of lectures illustrated with applications from the sciences, medicine, and everyday life, weekly labs tightly coupled to lectures that introduce computer-aided data acquisition and analysis, and recitations that emphasize cooperative problem-solving, provide a rich exposure to the methods of physics and the basic analytical and scientific communication skills required by all scientists. Course covers mechanics, conservation laws, waves, and topics from thermal physics, fluids, acoustics, and materials physics. At the level of *Fundamentals of Physics*, Vol. I, eighth ed., by Halliday, Resnick, and Walker.

PHYS 2208 Fundamentals of Physics II (PBS)

Spring, 4 credits. Prerequisites: PHYS 2207 or 1112 or 1101; substantial contact with introductory calculus (e.g., MATH 1110 or 1106). A continuation of PHYS 2207.

R. Fullbright.

Covers electricity and magnetism, and topics from geometrical and physical optics, quantum and nuclear physics. At the level of *Fundamentals of Physics*, Vol. II, eighth ed., by Halliday, Resnick, and Walker.

PHYS 2213 Physics II: Heat/Electromagnetism (PBS)

Fall, spring, summer (six-week session).

4 credits. Primarily for students of engineering and prospective physics majors. Prerequisite: PHYS 1112 and MATH 1920 or 2220. Coregistration with MATH 1920 may be allowed by instructor in exceptional cases. Fall, H. Tye; spring, P. Krasicky; summer, R. Wheeler.

Topics include temperature, heat, the laws of thermodynamics, electrostatics, behavior of matter in electric fields, DC circuits, magnetic fields, Faraday's law, AC circuits, and electromagnetic waves. At the level of *University Physics*, Vols. 1 and 2, by Young and Freedman, 12th ed.

PHYS 2214 Physics III: Oscillations, Waves, and Quantum Physics (PBS)

Fall, spring, summer (six-week session). 4 credits. Primarily for engineering students and prospective physics majors.

Prerequisites: PHYS 2213 and MATH 2930. Fall, A. Giambattista; spring, staff; summer, D. Briota.

Physics of oscillations and wave phenomena. Driven oscillations and resonance, mechanical waves, sound waves, electromagnetic waves, reflection and transmission of waves, standing waves, beats, Doppler effect, polarization, interference, diffraction, transport of momentum and energy, wave properties of particles, and introduction to quantum physics with applications to phenomena in physics, engineering, and biology.

PHYS 2216 Introduction to Special Relativity

Fall, spring; classes held in first 5–7 weeks. 1 credit. Enrollment may be limited.

Coregistration in this course is requirement for registration in PHYS 2217, unless the student has taken a relativity course at level of PHYS 1116 or ASTRO 1106.

Students cannot get credit for PHYS 2216 if they have taken PHYS 1116. Prerequisites: PHYS 1112 or 2207 or permission of instructor. S–U grades only.

Introduction to Einstein's Theory of Special Relativity, including Galilean and Lorentz transformations, the concept of simultaneity, time dilation and Lorentz contraction, the relativistic transformations of velocity, momentum and energy, and relativistic invariance in the laws of physics. At the level of *Introduction to Relativity* by J. B. Kogurt.

PHYS 2217 Physics II: Electricity and Magnetism (also AEP 2170) (PBS)

Fall, spring, 4 credits. Enrollment may be limited. Intended for students who have done very well in PHYS 1112 or 1116 and in mathematics and who desire more analytic treatment than that of PHYS 2213.

Prospective physics majors encouraged to register. Prerequisites: MATH 1920 or 2220. Corequisite: MATH 2930 or equivalent.

Placement quiz may be given early in semester, permitting students who find PHYS 2217 too abstract or analytical to transfer into PHYS 2213. Vector calculus is taught in this course, but previous contact, especially with the operations *grad*, *div*, and *curl*, is helpful. Therefore, coregistration with MATH 1920 will be allowed subject to instructor approval. It is assumed the student has seen special relativity at level of PHYS 1116 or is currently enrolled in PHYS 2216 and that student has covered material of MATH 1920. Fall, M. Wang; spring, staff.

PHYS 2218 Physics III: Waves and Thermal Physics (PBS)

Fall, spring, 4 credits. Enrollment may be limited. Intended for students who have done very well in PHYS 1116 and 2217 and in mathematics and who desire more analytic treatment than that of PHYS 2214. Prospective physics majors are encouraged to register. Prerequisites: PHYS 2217 (with grade of B or higher) and course in differential equations (MATH 2930) or permission of instructor. Fall, E.-A. Kim; spring, staff.

The first part of the course gives a thorough discussion of wave equations, including traveling waves, standing waves, energy, momentum, power, reflection and transmission, interference and diffraction. Derives wave equations on strings, sound, elastic media, and light. Covers solutions of these wave equations and Fourier series and transforms. The second part introduces thermodynamics and statistical mechanics, including heat engines, the Carnot cycle, and the concepts of temperature and entropy. Evening exams may be scheduled. At the level of *Physics of Waves* by Elmore and Heald and *Thermal Physics* by Schroeder.

PHYS 3310 Intermediate Experimental Physics (PBS)

Spring, 3 credits. Enrollment may be limited. Prerequisite: PHYS 2208 or 2213.

Students select from a variety of experiments. An individual, independent approach is encouraged. Facilities of the PHYS 4410 lab are available for some experiments.

PHYS 3314 Intermediate Mechanics (PBS)

Spring, 4 credits. Prerequisites: PHYS 2208 or 2214; or 2216 (or equivalent) and MATH 2940 (or equivalent). Assumes prior introduction to linear algebra and Fourier analysis. Intended for physics majors with concentration outside of physics or astronomy; PHYS 3318 covers similar material at more analytical level. D. G. Cassel.

Likely topics include Lagrangian mechanics; Newtonian mechanics based on a variational principle; conservation laws from symmetries; two-body orbits due to a central force; analysis of scattering experiments; small amplitude oscillating systems including normal mode analysis; parametrically driven systems; rigid body motion; motion in non-inertial reference frames; and nonlinear behavior including bistability and chaos. Students not only become more familiar with analytic methods for solving problems in mechanics but also gain experience with computer tools. At the level of *Classical Mechanics* by John R. Taylor.

PHYS 3316 Basics of Quantum Mechanics (PBS)

Fall, spring, 3 credits. Prerequisites: PHYS 2214 or 2218; PHYS 1116 or 2216; and coregistration in at least MATH 2940 or equivalent. Assumes that majors registering in PHYS 3316 will continue with PHYS 3317. Fall, G. Dugan; spring, M. Liepe.

Topics include breakdown of classical concepts in microphysics; light quanta and matter waves; Schrödinger equation and solutions for square well, harmonic oscillator, and the hydrogen atom; wave packets, scattering and tunneling effects, angular momentum, spin, and magnetic moments. At the level of *An Introduction to Quantum Physics* by French and Taylor.

PHYS 3317 Applications of Quantum Mechanics (PBS)

Fall. 3 credits. Prerequisite: PHYS 3316. I. Bazarov.

Covers a number of applications of quantum mechanics to topics in modern physics. Topics include: the physics of single and multi-electron atoms, quantum statistical mechanics, molecular structure, quantum theory of metals, band theory of solids, superconductivity, nuclear structure, radioactivity, nuclear reactions, and elementary particle physics.

PHYS 3318 Analytical Mechanics (PBS)

Spring. 4 credits. Prerequisites: PHYS 1116 or permission of instructor; AEP 3210 or appropriate course(s) in mathematics. Intended for junior physics majors concentrating in physics or astronomy. PHYS 3314 covers similar material at less demanding level. Assumes prior exposure to Fourier analysis, linear differential equations, linear algebra, and vector analysis. Staff.

Newtonian mechanics of particles and systems of particles, including rigid bodies; oscillating systems; gravitation and planetary motion; moving coordinate systems; Euler's equations; Lagrange and Hamilton formulations; normal modes and small vibrations; introduction to chaos. At the level of *Classical Mechanics* by Goldstein, *Classical Dynamics* by Marion and Thorton, and *Analytical Mechanics* by Hand and Finch. Supplementary reading is assigned.

PHYS 3323 Intermediate Electricity and Magnetism (PBS)

Fall. 4 credits. Prerequisites: PHYS 2208 or 2213/2214 (or equivalent) and MATH 2930/2940 (or equivalent). Recommended: coregistration in AEP 3210 or appropriate mathematics course. Intended for physics majors with concentration outside of physics or astronomy; PHYS 3327 covers similar material at more analytical level. A. Sievers.

Topics include electro/magnetostatics, boundary value problems, dielectric and magnetic media, Maxwell's Equations, electromagnetic waves, including guided waves, and sources of electromagnetic radiation. At the level of *Introduction to Electrodynamics* by Griffiths.

PHYS 3327 Advanced Electricity and Magnetism (PBS)

Fall. 4 credits. Prerequisites: PHYS 2217/2218 or permission of instructor. Corequisite: AEP 3210 or appropriate mathematics course(s). Intended for physics majors concentrating in physics or astronomy. PHYS 3323 covers similar material at less demanding level. Assumes knowledge of material at level of PHYS 2217 and makes extensive use of vector calculus, and some use of Fourier transforms and complex variables. I. Cohen.

Covers electro/magnetostatics, vector and scalar potentials, multipole expansion of the potential solutions to Laplace's Equation and boundary value problems; time-dependent electrodynamics; Maxwell's Equations, electromagnetic waves, reflection and refraction, wave guides, retarded potential, antennas; relativistic electrodynamics, four vectors, Lorentz, transformation of fields. At the level of *Classical Electromagnetic Radiation* by Heald and Marion.

PHYS 3330 Modern Experimental Optics (also AEP 3300) (PBS)

Fall. 4 credits. Limited enrollment. Prerequisite: PHYS 2214 or equivalent. G. Hoffstaetter.

A practical laboratory course in basic and modern optics. Students use lasers and basic optical bench equipment to cover a wide range of topics from geometrical optics to interference, diffraction, and polarization. Each experimental setup is equipped with standard, off-the-shelf optics and opto-mechanical components to provide the students with hands-on experience in practical laboratory techniques currently employed in physics, chemistry, biology, and engineering. Students are also introduced to digital imaging and image processing techniques. Five projects are prescribed and one last project defined and designed by the student with help from the instructor. At the level of *Optics* by Hecht.

PHYS 3341 Thermodynamics and Statistical Physics (PBS)

Fall. 4 credits. Prerequisites: PHYS 2214, 3316, and MATH 2940. V. Elser.

Covers statistical physics, developing both thermodynamics and statistical mechanics simultaneously. Also covers concepts of temperature, laws of thermodynamics, entropy, thermodynamic relations, and free energy. Applications to phase equilibrium, multicomponent systems, chemical reactions, and thermodynamic cycles. Application of statistical mechanics to physical systems, and introduction to treatment of Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics with applications. Elementary transport theory. At the level of *Fundamentals of Statistical and Thermal Physics* by Reif.

PHYS 3360 Electronic Circuits (also AEP 3630) (PBS)

Fall, spring. 4 credits. Prerequisites: undergraduate course in electricity and magnetism (e.g., PHYS 2208, 2213, or 2217) or permission of instructor. No previous electronics experience assumed, although course moves quickly through introductory topics such as basic DC circuits. Fall semester usually has smaller enrollment. S-U grade option available by permission of instructor for students who do not require course for major. Fall, E. Kirkland; spring, I. Bazarov.

Practical electronics as encountered in a scientific or engineering research/development environment. Analyze, design, build, and test circuits using discrete components and integrated circuits. Analog circuits: resistors, capacitors, operational amplifiers, feedback amplifiers, oscillators, comparators, passive and active filters, diodes and transistor switches and amplifiers. Digital circuits: combinational and sequential logic (gates, flip-flops, registers, counters, timers), analog to digital (ADC) and digital to analog (DAC) conversion, signal averaging, computer architecture and interfacing. Additional topics may include analog and digital signal processing, light wave communications, transducers, and noise reduction techniques and computer-aided circuit design. At the level of *Art of Electronics* by Horowitz and Hill.

PHYS 4400 Informal Advanced Laboratory

Fall, spring. 1-3 credits, variable. Prerequisites: two years physics or permission of instructor. P. McEuen.

Experiments of widely varying difficulty in one or more areas, as listed under PHYS 4410, may be done to fill the student's special requirements.

PHYS 4410 Advanced Experimental Physics (PBS)

Fall, spring. 4 credits. Prerequisite: senior standing or permission of instructor; PHYS 2214 (or 3310 or 3360) plus 3318 and 3327, or permission of instructor. P. McEuen.

Selected topics in experimental concepts and techniques. About 60 different experiments are available in acoustics, optics, spectroscopy, electrical circuits, electronics and ionics, magnetic resonance, X-rays, low temperature, solid state, cosmic rays, and nuclear physics. The student performs three to four different experiments, depending on difficulty, selected to meet individual needs and interests. Independent work is stressed. Lectures are on experimental techniques used in experiments in the laboratory and on current research topics.

PHYS 4443 Intermediate Quantum Mechanics (PBS)

Spring. 4 credits. Prerequisites: PHYS 3316, 3323, or 3327 or AEP 3210 or appropriate mathematics course(s); coregistration in PHYS 3314 or 3318; or permission of instructor. Assumes prior experience in linear algebra, differential equations, and Fourier transforms. Staff.

Provides an introduction to concepts and techniques of quantum mechanics, at the level of *An Introduction to Quantum Mechanics* by Griffiths.

PHYS 4444 Introduction to Particle Physics (PBS)

Spring. 4 credits. Prerequisite: PHYS 4443 or permission of instructor. Staff.

The standard model of particle physics; behavior of high-energy particles and radiation; elementary particles; basic properties of accelerators and detectors; general symmetries and conservation laws. At the level of *Introduction to Elementary Particles* by Griffiths or *Modern Elementary Particle Physics* by Kane.

PHYS 4445 Introduction to General Relativity (also ASTRO 4445) (PBS)

Fall. 4 credits. Offered as alternative to the more comprehensive, two-semester graduate sequence PHYS 6553 and 6554. L. McAllister.

One-semester introduction to general relativity, which develops the essential structure and phenomenology of the theory without requiring prior exposure to tensor analysis. General relativity is a fundamental cornerstone of physics that underlies several of the most exciting areas of current research, including relativistic astrophysics, cosmology, and the search for quantum theory of gravity. The course briefly reviews special relativity, introduces basic aspects of differential geometry, including metrics, geodesics, and the Riemann tensor, describes blackhole spacetimes and cosmological solutions, and concludes with the Einstein equation and its linearized gravitational wave solutions. At the level of *Gravity: An Introduction to Einstein's General Relativity* by Hartle.

PHYS 4454 Introductory Solid-State Physics (also AEP 4500) (PBS)

Fall. 4 credits. Prerequisite: PHYS 4443, AEP 3610, or CHEM 7930 highly desirable but not required. C. Fennie.

Introduction to modern solid-state physics, including crystal structure, lattice vibrations, electron theory of metals and semiconductors, and selected topics from magnetic properties, optical properties, superconductivity, and defects. At the level of *Introduction to Solid State Physics* by Kittel and *Solid State Physics* by Ashcroft and Mermin.

PHYS 4455 Geometrical Concepts in Physics (PBS)

Spring. 4 credits. Prerequisite: PHYS 3323 or equivalent and at least coregistration in PHYS 3318 or permission of instructor.

Usually offered every other spring.

Most nonquantum physical theories are based on one or another form of geometry:

Newtonian mechanics on Euclid, electromagnetism on Minkowski, general relativity on Riemann, string theory on higher dimensionality. This course surveys the unification of classical physics that accompanies the application of Hamilton's principle of least action to these various geometries. At the level of *Geometric Mechanics* by Talman.

[PHYS 4456 Introduction to Accelerator Physics and Technology (also PHYS 7656) (PBS)]

Fall. 3 credits. Prerequisites: PHYS 3323 or 3327 and PHYS 3314 or 3318. Next offered 2010–2011. G. Hoffstaetter.

Fundamental physical principles of particle accelerators and enabling technologies, with a focus on basic effects in linear and circular accelerations as used for elementary particle collision experiments and for X-ray sources.]

PHYS 4480 Computational Physics (also ASTRO 7690, PHYS 7680) (PBS)

Spring. 3 credits. Assumes familiarity with standard mathematical methods for physical sciences and engineering (differential equations, Fourier transforms, and linear algebra) and with some form of computer programming (e.g., C++, Octave, Mathematica, or Python). S–U grades except by permission of instructor. J. Sethna.

Covers numerical methods for ordinary and partial differential equations, linear algebra and eigenvalue problems, integration, nonlinear equations, optimization, and fast Fourier transforms. Find out how and why the “black-box” numerical routines you use work, how to improve and generalize them, and how to fix them when they don't. Based on the text *Numerical Recipes* by William H. Press, Saul A. Teukolsky, William T. Vetterling, and Brian P. Flannery.

PHYS 4481 Quantum Information Processing (also CS 4812, PHYS 7681) (PBS)

Spring. 3 credits. Prerequisite: familiarity with theory of finite-dimensional vector spaces over complex numbers.

A technology that successfully exploits fundamental principles of quantum physics can spectacularly alter both the nature of computation and the means available for the transmission of information.

PHYS 4484 Teaching and Learning Physics (also PHYS 7684)

Fall, spring. 1 credit. Prerequisites: none. R. Thorne.

This 1.5-hour weekly seminar provides undergraduate and graduate students with an introduction to core concepts in physics education. Participants discuss articles and videos drawn from physics and science education research and from cognitive science, and engage in collaborative activities that help them become more effective teachers and learners. This seminar is especially valuable for those considering teaching physics at some point in their careers. Topics include: Questioning Strategies, Classroom Discourse and Bloom's Taxonomy, Learning Theory, Conceptions and Conceptual Change, Epistemology, Metacognition, and Cooperative Learning. Text: Articles from science, engineering, and math education journals.

[PHYS 4487 Selected Topics in Accelerator Technology (also PHYS 7687)]

Fall. 2 credits. Prerequisite: PHYS 3323 or 3327. S–U grades only. Next offered 2010–2011.

Fundamentals of accelerator technology. Consists of a series of topical seminars covering the principal elements of accelerator technology.]

PHYS 4488 Advanced Topics in Accelerator Physics (also PHYS 7688) (PBS)

Spring. 3 credits. S–U grades only. G. Hoffstaetter.

After an introduction to the history of particle accelerators and to their fundamental physical principles, special topics in accelerator physics will be covered. Such topics are: microwave structures in particle acceleration, linear and nonlinear beam dynamics, collective effects and beam instabilities, characteristics of synchrotron radiation, a project in storage ring design, and experiments with charged particle beams at Cornell's accelerator laboratory.

PHYS 4490 Independent Study in Physics

Fall or spring. Variable to 4 credits; max. of 8 credits may be applied to physics major. Prerequisite: permission of professor who will direct proposed work. Copy of Request for Independent Study form must be filed with physics department course coordinator, 121 Clark Hall.

Individual project work (reading or laboratory) in any branch of physics.

PHYS 4491 Data Analysis in Particle Physics

Spring. Variable to 4 credits. Prerequisite: PHYS 1112 or 1116. J. Alexander.

A nuts-and-bolts training course covering essential tools and techniques of particle physics analysis. For students who want to do particle physics research.

PHYS 6500 Informal Graduate Laboratory

Fall, spring. Variable to 2 credits. Prerequisite: permission of instructor. P. McEuen.

Experiments of widely varying difficulty in one or more areas, as listed under PHYS 6510, may be done to fill special requirements.

PHYS 6501 Contemporary Physics for Teachers

Summer. 2 credits.

Lectures are given by Cornell faculty on topics including: atomic-scale imaging, the Standard

Model, and nanofabrication of integrated circuits. Hands-on activities developed by Cornell scientists working with teachers are presented by teachers. Activities are tied to the New York State Physics Core Curriculum where possible.

PHYS 6502 Topics in Physics for Teachers

Summer. 1 credit.

This is a lecture and laboratory course open to CIPT alumni and other high school physics teachers. The course is organized around daily themes that may include atomic games, physics with water, and discrepant events. Lectures are given by Cornell faculty; hands-on activities developed by Cornell scientists working with teachers are presented by teachers. Lab activities may include: a pinball game analogy to the Bohr model, interference in thin films, projectile motion with water, and energy conversion in a mousetrap. Activities are tied to the NYS Physics Core Curriculum where possible.

[PHYS 6503 Physics Education for Teachers

Summer. 1 credit. Primarily intended for graduate students. Next offered 2010–2011.

This rigorous 35-hour (one-week) course is designed specifically for secondary science teachers to increase physical science content knowledge as aligned with the NYS Intermediate core curriculum.]

PHYS 6510 Advanced Experimental Physics

Fall, spring. 3 credits. Optional lec associated with PHYS 4410 available. P. McEuen.

About 60 different experiments are available in acoustics, optics, spectroscopy, electrical circuits, electronics and ionics, magnetic resonance, X-rays, low temperature, solid state, cosmic rays, and nuclear physics. Students perform three to four experiments selected to meet individual needs. Independent work is stressed. Lectures include techniques used in experiments in the advanced laboratory and on current research topics.

PHYS 6520 Projects in Experimental Physics

Fall, spring. Variable to 3 credits. Prerequisite: PHYS 6510. To be supervised by faculty member. Students must advise department course coordinator of faculty member responsible for project.

Projects of modern topical interest that involve some independent development work by student. Opportunity for more initiative in experimental work than is possible in PHYS 6510.

PHYS 6525 Physics of Black Holes, White Dwarfs, and Neutron Stars (also ASTRO 6511)

Fall. 4 credits. Prerequisite: none. D. Lai. For description, see ASTRO 6511.

[PHYS 6553 General Relativity I (also ASTRO 6509)]

Fall. 4 credits. Prerequisite: knowledge of special relativity and methods of dynamics at level of *Classical Mechanics* by Goldstein. Next offered 2010–2011.

E. Flanagan.

A comprehensive introduction to Einstein's theory of relativistic gravity. This course focuses on the formal structure of the theory.]

[PHYS 6554 General Relativity II (also ASTRO 6510)]

Spring. 4 credits. Prerequisite: PHYS 6553 or permission of instructor. Next offered 2010-2011.

This course is a continuation of PHYS 6553 and ASTRO 6509 that covers a variety of advanced topics and applications of general relativity in astrophysics, cosmology and high-energy physics.]

PHYS 6561 Classical Electrodynamics

Fall. 3 credits. C. Csaki.

Covers special relativity, Maxwell's equations, electromagnetic potentials, Green's functions, electromagnetic waves, and radiation theory. The practical application of appropriate mathematical methods is emphasized. At the level of *Classical Electrodynamics* by Jackson.

PHYS 6562 Statistical Mechanics

Spring. 4 credits. Primarily for graduate students. Prerequisites: good knowledge of quantum mechanics, classical mechanics, and undergraduate-level thermodynamics or statistical mechanics class. Staff.

Starts with the fundamental concepts of temperature, entropy, and free energy, defining the microcanonical, canonical, and grand canonical ensembles. Touches upon Markov chains, random walks, diffusion equations, and the fluctuation-dissipation theorem. Covers Bose-Einstein and Fermi statistics, black-body radiation, Bose condensation, superfluidity, metals, and white dwarves. Discusses fundamental descriptions of phases, and introduces Landau theory, topological order parameters, and the homotopy classification of defects. Briefly studies first-order phase transitions and critical droplet theory and concludes with a discussion of critical phenomena, scaling, universality, and the renormalization group.

PHYS 6572 Quantum Mechanics I

Fall. 4 credits. D. Rubin.

Covers the general principles of quantum mechanics, formulated in the language of Dirac. Covers systems with few degrees of freedom such as hydrogen atom, including fine and hyperfine structure. Theory of angular momentum, symmetries, perturbations and collisions are developed to analyze phenomena displayed by these systems. At the level of *Quantum Mechanics: Fundamentals* by Gottfried and Yan. A knowledge of the subject at the level of PHYS 4443 is assumed, but the course is self-contained.

PHYS 6574 Applications of Quantum Mechanics II

Spring. 4 credits. Knowledge of concepts and techniques covered in PHYS 6561 and 6572 and of statistical mechanics at undergraduate level assumed.

Possible topics include identical particles, many electron atoms, second quantization, quantization of the electromagnetic field, scattering of complex systems, radiative transitions, and introduction to the Dirac equation.

PHYS 6599 Cosmology (also ASTRO 6599)

For description, see ASTRO 6599.

PHYS 7635 Solid-State Physics I

Fall. 3 credits. Prerequisites: good undergraduate solid-state physics course (e.g., PHYS 4454), undergraduate statistical mechanics, and familiarity with graduate-level quantum mechanics. D. Ralph.

Survey of the physics of solids: crystal structures, X-ray diffraction, phonons, and electrons. Selected topics from semiconductors, magnetism, superconductivity, disordered materials, dielectric properties, and mesoscopic physics. The focus is to enable graduate research at the current frontiers of condensed matter physics.

PHYS 7636 Solid-State Physics II

Spring. 3 credits. Prerequisite: PHYS 7635. Staff.

Continuation of PHYS 7635. Topics from quantum condensed-matter physics not included in that course, which may include Fermi Liquid Theory, magnetism, superconductivity, broken symmetries, elementary excitations, topological defects, superfluids, the quantum Hall effect, mesoscopic quantum transport theory, Anderson localization, and other metal insulator transitions.

PHYS 7645 An Introduction to the Standard Model of Particle Physics

Spring. 3 credits. A. Ryd.

This course is an introduction to the Standard Model of particle physics. Familiarity with Feynman rules, Lagrangians, and relativistic wave equations at the level of PHYS 7651 is assumed. Topics covered include strong and electro-weak interactions, Higgs mechanism, and phenomenology of weak interactions, the quark model, particle accelerators and detectors. The course is taught at the level of *Electroweak Interactions: An Introduction to the Physics of Quarks and Leptons* by Peter Renton and *Introduction to High-Energy Physics* by Donald H. Perkins, and *The Standard Model: A Primer* by Cliff Burgess and Guy Moore.

[PHYS 7646 Topics in High-Energy Particle Physics]

Spring. 3 credits. Next offered 2010-2011. Staff.

Covers topics of current interest, such as high-energy electron and neutrino interactions, electron positron annihilation, and high-energy hadronic reactions.]

PHYS 7651 Relativistic Quantum Field Theory I

Fall. 3 credits. Undergraduates letter grades only; grads S-U or letter grades. Y. Grossman.

Topics include consequences of causality and Lorentz invariance, quantization of Klein-Gordon and Dirac fields, perturbation theory, Feynman diagrams, calculation of cross sections and decay rates, and an introduction to radiative corrections and renormalization with applications to electromagnetic and interactions. At the level of *An Introduction to Quantum Field Theory* by Peskin and Schroeder.

PHYS 7652 Relativistic Quantum Field Theory II

Spring. 3 credits. Staff.

A continuation of PHYS 7651. Introduces more advanced methods and concepts in quantum field theory. Topics include functional integral methods, quantization of non-Abelian gauge theories, renormalization, and renormalization group theories, spontaneous symmetry breaking, anomalies, solitons, and instantons. Instead of the standard model of strong and electroweak interactions, some applications to condensed-matter physics will be discussed. At the level of *An Introduction to Quantum Field Theory* by Peskin and Schroeder.

PHYS 7653 Statistical Physics

Fall. 3 credits. Prerequisites: quantum mechanics at level of PHYS 6572, statistical physics at level of PHYS 6562. J. Sethna.

Survey of topics in modern statistical physics selected from phase transitions and the renormalization group, linear response and fluctuation-dissipation theories; quantum statistical mechanics; and nonequilibrium statistical mechanics; soft matter and/or biological applications.

PHYS 7654 Basic Training in Conditional Matter Physics

Spring. 3 credits. Prerequisites: PHYS 6562, 6574, 7635, 7636, and 7653, or permission of instructor. S-U grades only. Staff.

Advanced topics in condensed-matter physics are taught by several members of the faculty. Past modules include random matrix theory, the quantum Hall effect, disordered systems and computational complexity, asymptotic analysis, superfluid physics, generalized rigidity, many-body methods applied to nanotubes, constraint problems, quantum optics, Luttinger liquids, and quantum antiferromagnets. Future topics may include dilute cold gases and exotic quantum phenomena, thermodynamic Green's functions, 1/N expansions, density functional theory, instantons, dynamical mean-field theory, conformal field theory, Fermi liquid theory and superconductivity, localization and disordered metals, renormalization groups, duality transformations, and Chern-Simons gauge theory. Detailed course content will be announced at the end of the fall semester.

[PHYS 7656 Introduction to Accelerator Physics and Technology (also PHYS 4456)]

Next offered 2010-2011.

For description, see PHYS 4456.]

PHYS 7661 Advanced Topics in High-Energy Particle Theory

Fall. 3 credits. Prerequisite: PHYS 7652. S-U grades only. M. Perelstein.

Presents advanced topics of current research interest. Subject matter varies from year to year. Some likely topics are two-dimensional conformal field theory with applications to string theory.

[PHYS 7665 Seminar: Astrophysics Gas Dynamics (also ASTRO 7699)]

Next offered 2010-2011.

For description, see ASTRO 7699.]

[PHYS 7667 Theory of Stellar Structure and Evolution (also ASTRO 6560)]

Fall. 4 credits. Next offered 2010-2011. D. Chernoff.

For description, see ASTRO 6560.]

PHYS 7680 Computational Physics (also ASTRO 7690, PHYS 4480)

For description, see PHYS 4480.

PHYS 7681 Quantum Information Processing (also CS 4812, PHYS 4481)

For description, see PHYS 4481.

PHYS 7682 Computational Methods for Nonlinear Systems (also CIS 6229)

Fall. 3 credits. Enrollment may be limited. E. Mueller.

Graduate computer laboratory, focusing on tools for computation, simulation, and analysis of complex, nonlinear systems arising in a broad range of fields including physics, biology, engineering, applied mathematics, and computer science. The course is pitched

at a high level of computational sophistication, but is designed to fit into the busy schedules of first-year graduate students.

PHYS 7683-7689 Special Topics

Offerings are announced each semester.

Typical topics are group theory, analyticity in particle physics, weak interactions, superfluids, stellar evolution, surface physics, Monte Carlo methods, low-temperature physics, magnetic resonance, phase transitions, and the renormalization group.

PHYS 7684 Teaching and Learning Physics (also PHYS 4484)

For description, see PHYS 4484.

[PHYS 7687 Selected Topics in Accelerator Technology (also PHYS 4487)]

Next offered 2010–2011.

For description, see PHYS 4487.]

PHYS 7688 Advanced Topics in Accelerator Physics (also PHYS 4488)

For description, see PHYS 4488.

PHYS 7690 Independent Study in Physics

Fall or spring. Variable to 4 credits.

Students must advise department course coordinator, 121 Clark Hall, of faculty member responsible for grading their project. S–U grades only.

Special graduate study in some branch of physics, either theoretical or experimental, under the direction of any professorial member of the staff.

POLISH

See “Department of Russian.”

PORTUGUESE

See “Department of Romance Studies.”

PSYCHOLOGY

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The major areas of psychology represented in the department are perception, cognition, and development (PCD), behavioral evolutionary neuroscience (BEN), and social and personality psychology. These areas are very broadly defined, and the courses are quite diverse. Behavioral evolutionary neuroscience (BEN) includes animal learning, neuropsychology, interactions between hormones, other biochemical processes, and behavior. Perception, cognition, and development includes such courses as cognition, perception, memory, and psycholinguistics. Social and personality psychology is represented by courses in social psychology and personality (e.g., Psychology and Law, Judgment and Decision Making), as well as courses in fieldwork and

psychopathology. In addition to the three major areas mentioned above, the department emphasizes the statistical and logical analysis of psychological data and problems.

The Major

Admission to the major is usually granted to any student in good standing in the college who has passed three or more psychology courses with grades of C+ or better. Provisional admission requires two such courses. To apply to the major and receive an advisor, a major application form may be obtained from the department office (211 Uris Hall) and should be completed and taken to one of the faculty members whose name is listed on the form.

Requirements for the major are:

1. a total of 40 credits in psychology (including prerequisites), from which students majoring in psychology are expected to choose, in consultation with their advisors, a range of courses that covers the basic processes in psychology (laboratory and/or field experience is recommended); for any courses taken in 2009–2010 or later to count toward the 40 required credits, the student must earn a grade of C– or better; and
2. demonstration of proficiency in statistics before the beginning of the senior year. (See the section below on the statistics requirement.)

Normally it is expected that all undergraduate psychology majors will take at least one course in each of the following three areas of psychology:

1. **Perception, cognition, and development (PCD)**
2. **Behavioral evolutionary neuroscience (BEN)**
3. **Social and personality psychology**

The following classification of Department of Psychology offerings is intended to help students and their advisors choose courses that will ensure that such breadth is achieved.

1. **Perception, cognition, and development:** PSYCH 1102, 2050, 2090, 2140, 2150, 3050, 3160, 3420, 4120, 4180, 4260, 4270, 4280, 4320, 4360, 4370, 4650, 4780.
2. **Behavioral evolutionary neuroscience:** PSYCH 2230, 3220, 3240, 3260, 3320, 3610, 3960, 4200, 4230, 4240, 4250, 4290, 4310, 4350, 4400, 4410, 4440, 4920.
3. **Social and personality psychology:** PSYCH 2650, 2750, 2800, 2820, 3250, 3270, 3280, 3800, 3850, 4050, 4300, 4520, 4810, 4820, 4850, 4910.
4. **Other courses:** PSYCH 1101, 1990, 3470, 3500, 4101, 4700, 4710. The major advisor determines to which group, if any, these courses may be applied.

With the permission of the advisor, courses in other departments may be accepted toward the major requirements.

Fieldwork, independent study, and teaching.

The department requires students to observe the following limits on fieldwork, independent study, and teaching.

1. Undergraduates may not serve as teaching assistants for psychology courses if they

are serving as teaching assistants for any other course during the same semester.

2. An undergraduate psychology major cannot apply more than 12 of the credits earned in independent study (including honors work) and fieldwork toward the 40 credits required by the major.

Statistics requirement. Proficiency in statistics can be demonstrated in any one of the several ways listed below.

1. Passing PSYCH 3500.
2. Passing an approved course or course sequence in statistics in some other department at Cornell.
3. Passing a course or course sequence in statistics at some other college, university, or college level summer school. The course or sequence must be equivalent to at least 6 semester credits. The description of the course from the college catalog and the title and author of the textbook used must be submitted to Professor Gilovich for approval.
4. Passing an exemption examination. This examination can be given at virtually any time during the academic year if the student gives notice at least one week before. Students who have completed a theoretical statistics course in a department of mathematics or engineering and who wish to demonstrate competence in applied statistics usually find this option the easiest. Students planning this option should discuss it in advance with Professor Gilovich.

Concentration in biopsychology.

Psychology majors interested in psychology as a biological science can elect to specialize in biopsychology. Students in this concentration must meet all of the general requirements for the major in psychology and must also demonstrate a solid background in biology; the physical sciences, including at least introductory chemistry; and mathematics. Students will design with their advisors an integrated program in biopsychology built around courses on physiological, chemical, anatomical, and ecological determinants of human and nonhuman behavior offered by the Department of Psychology. Additional courses in physiology, anatomy, biochemistry, neurochemistry, neurobiology, and behavioral biology may be designated as part of the psychology major after consultation between the student and his or her biopsychology advisor.

Concentration in social and personality psychology.

Psychology majors who wish to specialize in social psychology are expected to meet the general requirements set by their department, including statistics. To ensure a solid interdisciplinary grounding, students in the concentration are permitted to include some major courses in sociology and related fields. Advisors will assist students in the selection of a coherent set of courses from social organization, cultural anthropology, experimental psychology, social methodology, and several aspects of personality and social psychology. Seniors in the concentration may elect advanced and graduate seminars, with the permission of the instructor.

Undergraduate honors program. The honors program is designed for exceptional students who wish to pursue an intensive and independent program of research in psychology. Successful participation serves as

evidence of the student's facility in the two most important skills required of an academic psychologist: namely, the capacity to acquire and integrate a substantial body of theoretical and factual material and the ability to devise and execute a creative empirical research project.

The honors program offers students the closest contact and consultation with faculty they will likely experience while at Cornell, and all qualified majors who are planning graduate work in any academic field should consider applying. However, it should also be noted that conducting honors research and completing a thesis is an extremely demanding undertaking, both in time and effort. Due to the demands of both research and writing, it is expected that after the Christmas break, honors students will return to campus as early as possible to continue their work, as well as remain on campus through all of spring break.

The focus of the honors program is conducting an experiment, analyzing the data that result, and describing the project in a thesis that closely approximates a professional-level research report both in form and quality. The research project is to be conducted under the close sponsorship of a faculty member. Subject to approval, the sponsor need not be in the psychology department per se. Students that successfully complete the honors program graduate with one of levels of honors, which is noted on their diplomas. The customary level is cum laude, awarded to approximately two-thirds of psychology honors graduates. Approximately one-third receive the next higher level of honors, which is magna cum laude. A student who has both an unusually strong academic record in psychology and completes a thesis of exceptionally high quality will be considered for summa cum laude, the highest level of honors. However, those are unusual cases. The T. A. Ryan Award, accompanied by a cash prize, is awarded to the student who conducts the best honors project in a given year. Students in the program register for 3 or 4 credits of PSYCH 4710 Independent Study in both fall and spring semesters. Format and binding of the thesis follows guidelines for the doctoral dissertation and master's thesis, outlined by the Cornell University Graduate School. Stylistic format is APA style. Alternative style formats are possible, if approved in advance.

Computing in the Arts Undergraduate Minor

A minor in Computing in the Arts with an emphasis on psychology is available both to psychology majors and to students majoring in other subjects.

Courses

PSYCH 1101 Introduction to Psychology: The Frontiers of Psychological Inquiry (SBA-AS)

Fall, summer (six-week). 3 credits.

Attendance at lec mandatory. Students who wish to take disc seminar should also enroll in PSYCH 1103. J. B. Maas.

The study of human behavior. Topics include brain functioning and mind control, psychophysiology of sleep and dreaming, psychological testing, perception, learning, cognition, memory, language, motivation, personality, abnormal behavior, psychotherapy, social psychology, and other aspects of

applied psychology. Emphasis is on developing skills to critically evaluate claims made about human behavior.

PSYCH 1102 Introduction to Cognitive Science (also COGST 1101, CS 1710, LING 1170, PHIL 1910) (KCM-AS)

Fall, summer (six-week). 3 or 4 credits (4-credit option involves writing sec instead of exams). Staff.

For description, see COGST 1101.

PSYCH 1103 Introductory Psychology Seminars

Fall. 1 credit. Limited to 200 students.

Corequisite: PSYCH 1101. 12 different time options. J. B. Maas and staff.

Weekly seminar that may be taken in addition to PSYCH 1101 to provide an in-depth exploration of selected areas in the field of psychology. Involves extensive discussion and a semester paper related to the seminar topic. Choice of seminar topics and meeting times are available at the second lecture of PSYCH 1101.

PSYCH 1110 Brain, Mind, and Behavior (also BIONB/COGST 1110) (PBS)

Spring. 3 credits. Prerequisite: freshmen and sophomores in humanities and social sciences; juniors and seniors not allowed.

Not recommended for psychology majors; biology majors may not use for credit toward major. Letter grades only. E. Adkins Regan and R. Hoy.

For description, see COGST 1110.

PSYCH 1650 Computing in the Arts (also CIS/CS/ENGRI 1610, DANCE 1540, FILM 1750, MUSIC 1465) (LA-AS)

Fall. 3 credits. G. Bailey.

For description, see CS 1610.

PSYCH 2050 Perception (also PSYCH 6050)

Fall. 3 credits. Open to all students.

Graduate students, see PSYCH 6050.

J. E. Cutting.

One of four introductory courses in cognitive psychology. Basic perceptual concepts and phenomena are discussed with emphasis on stimulus variables and sensory mechanisms. All sensory modalities are considered. Visual and auditory perception are discussed in detail.

PSYCH 2090 Developmental Psychology (also PSYCH 7090) (KCM-AS)

Spring. 4 credits. Graduate students, see PSYCH 7090. M. Goldstein.

One of four introductory courses in cognition and perception. A comprehensive introduction to current thinking and research in developmental psychology that approaches problems from both psychobiological and cognitive perspectives. We will use a comparative approach to assess principles of development change. The course focuses on the development of perception, action, cognition, language and social understanding in infancy and early childhood.

PSYCH 2140 Cognitive Psychology (also COGST 2140/6140, INFO 2140, PSYCH 6140) (KCM-AS)

Spring. 4 credits. Limited to 200 students.

Prerequisite: sophomore standing.

Graduate students, see PSYCH 6140.

S. Edelman.

Introduces the idea of cognition as information processing or computation, using examples from perception, attention and consciousness, memory, language, and thinking. Participants acquire conceptual tools

that are essential for following the current thought on the nature of mind and its relationship to the brain.

PSYCH 2150 Psychology of Language (also COGST 2150, LING 2215) (KCM-AS)

Spring. 3 credits. Prerequisites: sophomore, junior, or senior standing; any one course in psychology or human development.

M. Christiansen.

Provides an introduction to the psychology of language. The purpose of the course is to introduce students to the scientific study of psycholinguistic phenomena. Covers a broad range of topics from psycholinguistics, including the origin of language, the different components of language (phonology, morphology, syntax, and semantics), processes involved in reading, computational modeling of language processes, the acquisition of language (both under normal and special circumstances), and the brain bases of language.

PSYCH 2230 Introduction to Biopsychology (PBS: supplementary list)

Fall. 3 credits. Prerequisites: none. May be used to satisfy psychology major breadth requirement and as alternative prerequisite for upper-level biopsychology courses.

D. Smith.

Introduction to psychology from a biological perspective, which focuses on brain mechanisms of behavior. Topics include the structure and function of the nervous system, physiological approaches to understanding behavior, hormones and behavior, biological bases of sensation and perception, learning and memory, cognition, emotion, and communication.

Introductory courses in social and personality psychology. Each of the following three courses (2650, 2750, 2800) provides an introduction to a major area of study within social and personality psychology. These courses are independent of one another, and none have any prerequisites. Students may take any one of the courses or any combination of them (including all three). Courses may be taken in any order or simultaneously.

PSYCH 2610 Development of Social Behavior (also HD 2610) (SBA-AS)

Fall. 3 credits. Prerequisites: HD 1150, PSYCH 1101. J. Mikels.

For description, see HD 2610.

PSYCH 2650 Psychology and Law (SBA-AS)

Fall. 3 credits. D. A. Dunning.

Examines the implications of psychological theory and methods for law and the criminal justice system. Concentrates on psychological research on legal topics (e.g., confession, eyewitness testimony, jury decision making, homicide, aggression, the prison system), social issues (e.g., death penalty, affirmative action), and on psychologists as participants in the legal system (e.g., assessing insanity and dangerousness and for expert testimony).

PSYCH 2750 Introduction to Personality Psychology (also HD 2600) (SBA-AS)

Fall. 3 credits. Recommended: introductory psychology or human development.

V. Zayas.

A shared assumption among personality psychologists is that each person possesses a personality—i.e., characteristic ways of thinking, feeling, and behaving—that uniquely

distinguishes him or her from other people. Each individual's personality is the culmination of his or her genetic makeup, biology, early life experiences, learning and culture. In this undergraduate-level course, we will review the major theories and research paradigms (e.g., trait, biological, cognitive) of modern-day personality psychology. The course will emphasize contemporary research, theory, and methodology, as well as provide a review of historical accounts that have significantly contributed to current conceptualizations.

PSYCH 2800 Introduction to Social Psychology (SBA-AS)

Spring, summer (three-week). 3 credits.
T. D. Gilovich and D. T. Regan.

Introduction to research and theory in social psychology. Topics include social influence, persuasion, and attitude change; social interaction and group phenomena; altruism and aggression; stereotyping and prejudice; and everyday reasoning and judgment.

PSYCH 2820 Community Outreach (also HD 2820)

Fall. 2 credits. Prerequisites: PSYCH 1101 or HD 1150. H. Segal.

Provides students with information and perspectives essential to volunteer fieldwork with human and social service programs in the community. Readings are drawn from the field of community psychology and include analyses of successful programs, such as Head Start, as well as a review of the methods by which those programs are developed and assessed. Although students are not required to volunteer, the instructor provides students with a list of local agencies open to student placements.

PSYCH 3050 Visual Perception (also VISST 3305)

Spring. 4 credits. Limited to 25 students.
Prerequisite: PSYCH 2050 or permission of instructor. J. E. Cutting.

Detailed examination of pictures and their comparison to the real world. Linear perspective in Renaissance art, photography, cinema, and video is discussed in light of contemporary research in perception and cognition.

PSYCH 3130 Problematic Behavior in Adolescence (also HD 3130)

Fall. 3 credits. Prerequisite: HD 1150 or PSYCH 1101. Recommended: HD 2160.
M. W. J. Haugaard.

For description, see HD 3130.

PSYCH 3150 Obesity and the Regulation of Body Weight (also NS 3150)

Spring. 3 credits. Limited to 30 students.
Prerequisites: one course each in psychology and nutrition; undergraduates by permission of instructor. S-U or letter grades. Offered alternate years.
D. A. Levitsky.

Multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include the biopsychology of eating behavior, the genetics of obesity, the role of activity and energy metabolism, psychosocial determinants of obesity, anorexia nervosa, therapy and its effectiveness, and social discrimination.

PSYCH 3160 Auditory Perception (also PSYCH 7160) (KCM-AS)

Spring. 4 credits. Limited to 15 students.
Prerequisite: PSYCH 1102, 2050, 2090, or 2140 (or other similar engineering, physics, linguistics, or biology courses). Graduate students, see PSYCH 7160. C. L. Krumhansl.

Lab course designed to introduce students to experimental methods in auditory perception and cognition. Students learn principles of experimental design and statistical analysis, conduct a literature review in their chosen area of research, and complete at least one independent research project. Computers are available and used in many of the experiments although computer literacy is not required. Projects are selected from the areas of auditory perception, perceptual organization, and memory of music, speech, and environmental sounds.

[PSYCH 3220 Hormones and Behavior (also BIONB 3220, PSYCH 7220) (PBS)]

Fall. 3 credits. Two lec plus sec in which students read and discuss original papers in the field, give an oral presentation, and write a term paper. Prerequisites: junior or senior standing; any one of the following: PSYCH 2230, BIONB 2210 or 2220, or one year introductory biology plus psychology course. Graduate students, see PSYCH 7220. Next offered 2010–2011. E. Adkins Regan.

Comparative and evolutionary approaches to the study of the relationship between reproductive hormones and sexual behavior in vertebrates, including humans. Also hormonal contributions to parental behavior, aggression, stress, learning and memory, and biological rhythms.]

PSYCH 3240 Biopsychology Laboratory (also BIONB 3240) (PBS)

Fall. 4 credits. Limited to 20 students.
Prerequisites: junior or senior standing; PSYCH 2230 or BIONB 2210 or 2220, and permission of instructor. Lab fee: \$50.
T. J. DeVoogd.

Experiments designed to provide experience in animal behavior (including learning) and its neural and hormonal mechanisms. A variety of techniques, animal species, and behavior patterns are included.

PSYCH 3250 Adult Psychopathology (also HD 3700) (SBA-AS)

Spring. 3 credits. Prerequisite: sophomore, junior, or senior standing; any one course in psychology or human development. No S-U option. H. Segal.

A theoretical and empirical approach to the biological, psychological, and social (including cultural and historical) aspects of adult psychopathology. Readings range from Freud to topics in psychopharmacology. The major mental illnesses are covered, including schizophrenia as well as mood, anxiety, and personality disorders. Childhood disorders are not covered.

PSYCH 3260 Evolution of Human Behavior (PBS: Supplementary List)

Spring. 4 credits. Prerequisite: PSYCH 2230, or introductory biology, or introductory anthropology. R. E. Johnston.

Broad comparative approach to the behavior of animals and humans with special emphasis on the evolution of human behavior. Topics vary but include some of the following: human evolution, evolutionary and sociobiological theory, animal communication, nonverbal communication, language, cognitive capacities,

social behavior and organization, cooperation and altruism, sexual behavior, mating and marriage systems, aggression, and warfare.

PSYCH 3270 Field Practicum I (also HD 3270) (SBA-AS)

Fall only. 3 credits. Limited enrollment.
Prerequisites: PSYCH 3250 or HD 3700 (or taken concurrently), and permission of instructor. Students must commit to taking PSYCH 3280 in spring semester. Letter grades only. H. Segal.

Composed of three components that form an intensive undergraduate field practicum. First, students spend three to six hours a week at local mental health agencies, schools, or nursing facilities working directly with children, adolescents, or adults; supervision is provided by host agency staff. Second, the instructor provides additional weekly individual, clinical supervision for each student. Third, seminar meetings cover issues of adult and developmental psychopathology, clinical technique, case studies, and current research issues. Students write one short paper, two final take-home exams, and present an account of their field experience in class.

PSYCH 3280 Field Practicum II (also HD 3280) (SBA-AS)

Spring. 3 credits. Limited enrollment.
Prerequisites: PSYCH 3270 taken previous semester, PSYCH 3250 or HD 3700 (or taken concurrently), permission of instructor. Letter grades only. H. Segal.

Continues the field practicum experience from PSYCH 3270.

[PSYCH 3300 Introduction to Computational Neuroscience (also BIONB/BME/COGST 3300) (PBS)]

Fall. 3 or 4 credits. Next offered 2010–2011.
C. Linster.

For description, see BIONB 3300.]

PSYCH 3320 Biopsychology of Learning and Memory (also BIONB 3280, PSYCH 6320) (PBS)

Spring. 3 credits. Limited to 60 students.
Prerequisites: one year of biology and either a biopsychology course or BIONB 2220. Graduate students, see PSYCH 6320.
T. J. DeVoogd.

Surveys the approaches that have been or are currently being used to understand the biological bases for learning and memory. Topics include invertebrate, "simple system" approaches, imprinting, avian song learning, hippocampal and cerebellar function, or research using fMRI pathology in humans. Many of the readings are from primary literature.

PSYCH 3420 Human Perception: Applications to Computer Graphics, Art, and Visual Display (also COGST 3420, PSYCH 6420, VISST 3342)

Fall. 3 or 4 credits; 4-credit option involves term paper. Highly recommended: PSYCH 2050. Graduate students, see PSYCH 6420.
D. J. Field.

Our present technology allows us to transmit and display information through a variety of media. To make the most of these media channels, it is important to consider the limitations and abilities of the human observer. The course considers a number of applied aspects of human perception with an emphasis on the display of visual information. Topics include "three-dimensional" display systems, color theory, spatial and temporal limitations of the visual systems, attempts at subliminal communication, and "visual" effects in film and television.

PSYCH 3470 Psychology of Visual Communications (SBA-AS)

Spring. 3 credits. Limited to 15 students.

Prerequisites: PSYCH 1101 and permission of instructor. J. B. Maas.

Exploration of theories of education, communication, perception, attitude, and behavior change as they relate to the effectiveness of visually based communication systems. Emphasis is on the use of photography and computer graphics to deliver educational messages. A digital camera with manual control of f-stops and shutter speed is mandatory.

PSYCH 3500 Statistics and Research Design (MQR)

Fall, summer (three-week). 4 credits.

Limited to 120 students. Staff.

Acquaints the student with the elements of statistical description (e.g., measures of average, variation, correlation) and, more important, develops an understanding of statistical inference. Emphasis is placed on those statistical methods of principal relevance to psychology and related behavioral sciences.

[PSYCH 3610 Biopsychology of Normal and Abnormal Behavior (also NS 3610) (PBS: Supplementary List)

Spring. 3 credits. Limited to 50 students in psychology and 50 students in nutritional sciences. Prerequisites: junior or senior standing; introductory biology and introductory psychology or permission of instructor. S-U or letter grades. Next offered 2010-2011. B. J. Strupp.

For description, see NS 3610.]

[PSYCH 3800 Social Cognition (SBA-AS)

Fall. 3 credits. Prerequisites: junior or senior standing; PSYCH 2800. Next offered 2010-2011. M. Ferguson.

What are the causes and consequences of our own and other's judgments, feelings, attitudes, and behaviors? This course introduces students to social cognition, which is a research perspective that uses both cognitive and social psychological theories and methodologies to explain such social phenomena.]

PSYCH 3850 The Psychology of Emotion (SBA-AS)

Spring. 3 credits. D. Pizarro.

We've all been mad, sad, happy, and disgusted. Some of us get nostalgic at times, and some of us are easily embarrassed. We've been feeling these emotions nearly our whole lives, and this makes us all emotion experts of a sort. Nonetheless, these feelings can be mysterious. Where do they come from? Do people across all cultures experience similar emotions? How can we regulate our emotions? Do emotions make us less rational? Do they make us smarter? What triggers certain emotions? Are there gender differences in emotions? The science of emotion is fairly young, but there has been an enormous amount of progress in understanding emotional phenomena in the last few decades. In this course, we will tackle the aforementioned questions and more. By the end of the course you should be familiar with the most influential theories of emotion—from the evolutionary explanations of emotion to the developmental and social factors involved in making us emotional creatures. So while we are all intuitive experts on emotion, by the end of the course you will have a different kind of expertise—one grounded in the most recent scientific discoveries in this exciting field.

[PSYCH 3960 Introduction to Sensory Systems (also BIONB 3960) (PBS)

Spring. 4 credits. Limited to 35 students.

Next offered 2011-2012. B. P. Halpern.

Somesthetic, auditory, and visual system neuroscience principles and methods of study are taught using the Socratic method. Original literature read and discussed.]

[PSYCH 4050 Intuitive Judgment (SBA-AS)

Fall. 4 credits. Limited to 18 students by

application. Priority given to senior psychology majors. Prerequisites: at least one course in each of social and cognitive psychology. Next offered 2010-2011.

T. Gilovich.

This course examines classic and contemporary scholarship on the subject of how people make judgments and decisions in their everyday and professional lives.]

PSYCH 4101 Undergraduate Seminar in Psychology

Fall or spring. 2 credits. Priority given to psychology majors. Staff.

Information on specific sections for each semester, including instructor, prerequisites, and time and place, may be obtained from the Department of Psychology office, 211 Uris Hall.

PSYCH 4120 Laboratory in Cognition and Perception (also COGST 4120, PSYCH 6121) (KCM-AS)

Spring. 4 credits. Limited to 15 students.

Prerequisite: statistics and one course in cognition or perception recommended. Graduate students, see PSYCH 6120.

D. J. Field.

Laboratory course designed to introduce students to experimental methods in perception and cognitive psychology. Students take part in a number of classic experiments and develop at least one independent project. Computers are available and used in many of the experiments although computer literacy is not required. Projects are selected from the areas of visual perception, pattern recognition, memory, and concept learning.

PSYCH 4180 Psychology of Music (also MUSIC 4181, PSYCH 6180) (KCM-AS)

Fall. 3 or 4 credits, depending on whether student elects to do independent project.

Intended for upper-level students in music, psychology, engineering, computer science, linguistics, physics, anthropology, biology, and related disciplines. Some music background desirable but no specific musical skills required. Graduate students, see PSYCH 6180. C. L. Krumhansl.

Covers the major topics in the psychology of music treated from a scientific perspective. Reviews recent developments in the cognitive science of music, beginning with music acoustics and synthesis, and extending to music and its emotional and social effects.

PSYCH 4200 Advanced Neurobiology Learning and Memory (also PSYCH 6200) (KCM-AS)

Spring. 3 credits. Prerequisites: PSYCH 2230 or HD 2200 and BIONB 2220. Offered alternate years. D. Smith.

This seminar will examine the neural mediation of learning and memory processes, broadly defined to include simple and complex forms of learning in humans and animals. After a historical overview, students will discuss cutting edge literature on the brain mechanisms of learning and memory. Topics will be decided upon by the participants and may include the cellular

mechanisms of plasticity (e.g., LTP), neural circuits involved in Pavlovian conditioning and instrumental learning, spatial memory, emotional memory, working memory, episodic and semantic memory.

PSYCH 4230 Navigation, Memory, and Context: What Does the Hippocampus Do? (also PSYCH 6230) (SBA-AS)

Spring. 3 credits. Prerequisites: intended for juniors, seniors, and graduate students.

Offered alternate years. D. Smith.

Although the hippocampus has been the subject of intense scrutiny for nearly 50 years, there remains considerable disagreement about functional contributions the hippocampus makes to learning and memory process. This seminar will examine the diverse functions attributed to the hippocampus with an eye toward integrating the differing viewpoints in the literature. After a brief historical overview, students will discuss cutting-edge literature on the hippocampal role in spatial navigation, learning, and memory, and context processing.

PSYCH 4240 Neuroethology (also BIONB 4240) (PBS)

Fall. 4 credits. Prerequisites: BIONB 2210 or 2220 or BIOG 1101-1102 and permission of instructor. S-U or letter grades. disc, one hour each week.

C. D. Hopkins.

For description, see BIONB 4240.

[PSYCH 4250 Cognitive Neuroscience (also BIONB 4230, PSYCH 6250) (KCM-AS)

Fall. 4 credits. Prerequisites: introductory biology; biopsychology or neurobiology (e.g., PSYCH 2230 or BIONB 2210, 2220); and an introductory course in perception, cognition, or language (e.g., PSYCH 1102, 2090, 2140, or 2150). Graduate students, see PSYCH 6250. S-U or letter grades. Offered alternate years; next offered 2010-2011. B. L. Finlay.

Studies the relationship between structure and function in the central nervous system, stressing the importance of evolutionary and mechanistic approaches for understanding the human behavior and cognition.]

[PSYCH 4260 Learning Language (also COGST 4260, PSYCH 7260) (KCM-AS)

Spring. 4 credits. Prerequisite: PSYCH 1140 or permission of instructor. Letter grades only. Next offered 2010-2011. S. Edelman.]

PSYCH 4270 Evolution of Language (also COGST 4270, PSYCH 6270)

Fall. 3 credits. Prerequisite: junior or senior standing; any one course in psychology or human development. Graduate students, see PSYCH 6270. S-U or letter grades.

Offered alternate years. M. Christiansen.

Seminar surveying a cross-section of modern theories, methods, and research pertaining to the origin and evolution of language. Considers evidence from psychology, the cognitive neurosciences, comparative psychology, and computational modeling of evolutionary processes. Topics for discussion may include: What does the fossil record tell us about language evolution? What can we learn from comparative perspectives on neurobiology and behavior? Can apes really learn language? Did language come about through natural selection? What were the potential preadaptations for language? What is the relationship between phylogeny and ontogeny?

[PSYCH 4280 Connectionist Psycholinguistics (also COGST 4280, LING 4428/6628, PSYCH 6280)]

Fall. 3 credits. Prerequisite: senior standing or permission of instructor. Graduate students, see PSYCH 6280. Offered alternate years; next offered 2010–2011. T. M. Christiansen.]

[PSYCH 4290 Olfaction and Taste: Structure and Function (also BIONB 4290, PSYCH 6290) (PBS)]

Spring. 4 credits. Next offered 2010–2011. B. Halpern.

Explores structural and functional characteristics of smelling and tasting by reading and discussing current literature in these areas, using the Socratic method.]

[PSYCH 4300 Moral Reasoning (also PSYCH 6300) (SBA-AS)]

Fall. 4 credits. Prerequisites: open to junior and senior psychology majors and to graduate students; open to others by permission of instructor. Next offered 2010–2011. D. Pizarro.

In recent years there has been a resurgence of interest in the science of morality. Recently, scientists across a wide range of disciplines have made discoveries that bear on the question of how and why humans have a sense of morality. The goals of this course are to offer an introduction to the science behind our moral sense. In order to achieve this goal, we will read articles on almost every area of scientific psychology. By the end of the course you should be well versed in the primary issues and debates involved in the scientific study of morality.]

PSYCH 4310 Effects of Aging on Sensory and Perceptual Systems (also BIONB 4210, PSYCH 6310) (PBS)

Fall. 3 or 4 credits; 4-credit option involves term paper or creation of relevant web site. Limited to 35 students. Prerequisites: introductory biology or psychology, plus second course in perception, neuroscience, cognitive science. Graduate students, see PSYCH 6310. B. P. Halpern.

Literature-based examination of post-maturation changes in the perceptual, structural, and physiological characteristics of somesthetic, visual, auditory, and chemosensory systems. Emphasis is on human data, with nonhuman information included when especially relevant. Quality of life issues are included. Current developments in human sensory prosthetic devices, and in regeneration or replacement of receptor structures or organs are examined. Brief written statements by e-mail of questions and problems related to each set of assigned readings are required in advance of each class meeting and are automatically distributed to all members of the class. This course is taught using the Socratic method, in which the instructor asks questions of the students. Student responses will be made using clickers, which will be used only for responses to questions and not for attendance or grading (<http://atc.cit.cornell.edu/course/polling/clickers.cfm>). Students read, analyze, and discuss in class difficult original literature dealing with the subject matter of the course. Students are expected to come to each class having already done and thought about the assigned readings, and to take an active part in every class. All examinations are take-home.

PSYCH 4340 Sensory Construction (also PSYCH 6364)

Spring. 3 credits. Prerequisites: one introductory course in neurobiology (PSYCH 2230 or BIONB 2220) and one intro course in perception or cognition (PSYCH 1102, 2050, 2090, or 2140) or permission of instructor. T. Cleland.

Is it true that everything you encounter is stored somewhere in your memory, if only you could recall it? How does that information get into your brain in the first place? This course investigates how coherent sensory percepts are constructed from the physical features of sensory stimuli, the properties of animal sensors and neural circuits, the active allocation of cognitive and physiological resources to selective sampling, and the integration of sampled data, prior knowledge, and expectations. Emphasis is placed on integrating multiple approaches—including biophysical, neurobiological, evolutionary, cognitive, social, and legal—to the problem of complex perception, cognition and memory.

[PSYCH 4350 Olfaction, Pheromones, and Behavior]

Fall. 4 credits. Prerequisites: introductory biology and course in neurobiology and behavior or biopsychology or 3000-level course in biopsychology or permission of instructor. Offered alternate years. R. Johnston.

Covers chemical signals, olfaction, and behavior in vertebrates (including humans), as well as the neurobiology of olfaction and odor-mediated behaviors. Behavioral topics may vary from year to year but include evaluation of and advertisement for mates, aggression and territorial behavior, parental-young interactions, social recognition (species, sex, individual, kin reproductive state, status), memory for odors, odor and endocrine interactions, imprinting, and homing and navigation. Basic aspects of the structure and function of the olfactory system are also covered, including the molecular biology of chemo-reception, olfactory coding, and higher-order processing in the central nervous system. The format includes lectures, discussions, and student presentations.]

PSYCH 4360 Language Development (also COGST/HD 3370, LING 4436) (KCM-AS)

Fall. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll under HD 6330/LING 4700/PSYCH 6000, supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. S–U or letter grades. B. Lust. For description, see HD 3370.

PSYCH 4370 Lab Course: Language Development (also COGST 4500, HD 4370, LING 4450)

Spring. 2 credits. Offered in conjunction with COGST/HD 4360 and LING 4436, Language Development. R. B. Lust. Optional supplement to the survey course Language Development (HD 3370, COGST/LING/PSYCH 4360). Provides students with a hands-on introduction to scientific research, including design and methods, in the area of first-language acquisition. For description, see COGST 4500.

PSYCH 4380 Social Neuroscience

Fall. 4 credits. Prerequisite: PSYCH 2230, 3220, 3320, or 3260. B. Johnston.

Comparative approach to the neural and endocrine mechanisms of social behavior in animals and humans. Species similarities and differences in these mechanisms related to evolved differences in social organization and mating systems. In humans, mechanisms related to difficulties with social interaction and behavior such as Asperger's syndrome, autism, and social anxiety psychopathology.

PSYCH 4400 To Sleep, Dream, and Remember (also PSYCH 6400)

Fall. 4 credits. Prerequisites: at least PSYCH 2230 or BIONB 2210. Recommended: additional course in biology, biopsychology, or neurobiology. S–U or letter grades. Graduate students, see PSYCH 6400. H. S. Porte.

What brain events instigate, maintain, and switch the states of sleep? How does the brain construct a dream? What brain events produce and sustain a night terror? Does the sleeping brain work for memory or against it? These questions will be considered as problems in cognitive neuroscience. Students must be conversant with brain anatomy and brain physiology.

PSYCH 4410 Laboratory in Sleep Research (also PSYCH 6410)

Spring. 4 credits. Lab fee: \$50. Graduate students, see PSYCH 6410. H. S. Porte.

Emphasizing the neurobiology of sleep state, this course introduces students to the laboratory study of human sleep and its psychological correlates. Serving as both experimenter and subject, each student learns the physical rationale and techniques of electroencephalography and other bioelectric measures of behavioral state. Analyzing data they have collected themselves, students work in small groups to complete a collaborative term project. Overnight sleep recording sessions are required.

[PSYCH 4440 Neural Computation (also BIONB 4440) (PBS)]

Spring. 3 credits. Limited to 10 students. Prerequisites: PSYCH 2230 or BIONB 2220, or permission of instructor. S–U or letter grades. Offered alternate years; next offered 2010–2011. T. Cleland.

Lecture and computer lab course covering the biophysical mechanisms underlying neural computation and information coding by neurons and networks. Students will study and develop computational models of single neurons and small neural networks. An independent modeling project will be required.]

PSYCH 4520 Trauma and Treatment (also PSYCH 6520) (SBA-AS)

Fall. 4 credits. Limited to 10 students; priority given to senior psychology and human development majors. Prerequisite: course work in both psychopathology and social development; permission of instructor by e-mail application during preregistration. Letter grades only. S. Bem.

An in-depth examination of psychological trauma and its treatment in psychotherapy. Special attention is given to the neuroscience of danger, defense, and emotional dysregulation, the effects of early traumatic attachment on development, the key role of dissociation, and an array of treatments including dialectical behavior therapy, play therapy, sensorimotor therapy, gestalt therapy, and psychoanalytic therapy.

PSYCH 4650 Topics in High-Level Vision: Embodied Cognition (also COGST 4650, PSYCH 6650) (KCM-AS)

Spring. 4 credits. Graduate students, see PSYCH 6650. Offered alternate years. S. Edelman and M. Goldstein.

High-level vision is a field of study concerned with functions such as visual object recognition and categorization, scene understanding, and reasoning about visual structure. It is an essentially cross-disciplinary endeavor, drawing on concepts and methods from neuroanatomy and neurophysiology, cognitive psychology, applied mathematics, computer science, and philosophy. This course concentrates on a critical examination of a collection of research publications, linked by a common thread, from the diverse perspectives offered by the different disciplines. Students write biweekly commentaries on the assigned papers and a term paper integrating the material covered in class.

PSYCH 4700 Undergraduate Research in Psychology

Fall or spring. 1-4 credits. Prerequisite: written permission from staff member who will supervise the work and assign grade must be included with course enrollment material. Students should enroll in section listed for that staff member; section list available from Department of Psychology. S-U or letter grades. Staff.

Practice in planning, conducting, and reporting independent laboratory, field, and/or library research.

PSYCH 4710 Advanced Undergraduate Research in Psychology

Fall or spring. 1-4 credits. Prerequisite: written permission of staff member who will supervise work and assign grade must be included with course enrollment material. Students should enroll in section listed for that staff member; section list available from Department of Psychology. S-U or letter grades. Staff.

Advanced experience in planning, conducting, and reporting independent laboratory, field, and/or library research. One, and preferably two, semesters of PSYCH 4700 is required. The research should be more independent and/or involve more demanding technical skills than that carried out in PSYCH 4700.

[PSYCH 4780 Parenting and Child Development (also HD 4440, PSYCH 6780) (KCM-AS)]

Fall. 4 credits. Limited to 25 students. Intended for seniors and graduate students. Graduate students, see PSYCH 678. Next offered 2010-2011. M. Goldstein.]

PSYCH 4810 Advanced Social Psychology (also PSYCH 6810)

Fall. 4 credits. Limited to 15 students, by application. Priority given to senior psychology majors. Graduate students, see PSYCH 6810. D. T. Regan.

The focus is on current readings, namely selected articles from very recent issues of the best social psychological journals. Readings are chosen for their importance, their readability, and the likelihood that they will generate stimulating discussion.

PSYCH 4820 Automaticity (also PSYCH 6820) (SBA-AS)

Spring. 4 credits. Prerequisites: PSYCH 2800; at least one course in cognitive psychology or permission of instructor. R. M. Ferguson.

What is automaticity? This is a topic that has gained considerable momentum in social psychology over the past 10 to 15 years and has been broadly applied to classic social psychological phenomena, including judgments, attitudes, emotion, motivation, and behavior. The crux of this momentum has been the controversial argument that such phenomena can occur without a person's awareness, intention, effort, or control. Although there is an abundance of empirical work on this topic, there still remain a number of unanswered and interesting questions. The objective of the course is twofold. The first is for students to learn the automaticity literature in social psychology; the second is to identify such critical questions, and speculate on possible answers. The course reviews the wide range of theoretical and empirical work on automaticity and examines contemporary definitions of automaticity within social and other areas of psychology. The analysis of automaticity is necessarily closely linked with issues such as unconscious vs. conscious processing, attention, control, intentionality, and free will.

PSYCH 4850 The Self (also PSYCH 6850) (SBA-AS)

Spring. 4 credits. Limited to 15 students. Prerequisite: PSYCH 2750 or 2800 or permission of instructor, with priority given to seniors and graduate students. D. Dunning.

An enduring task in psychological inquiry has been to survey the ways in which a person's self-image influences emotion, thought, and action. What is self-esteem, and is it a good or a bad thing? How do concerns over self-image motivate people? Do people really know themselves accurately? How does a person's sense of self develop, and does it differ across cultures? Students will be introduced to these and other topics by reading original research articles, and should expect to take part in class discussions of the issues raised.

PSYCH 4910 Research Methods in Psychology (also COGST 4910, COGST/PSYCH 6910)

Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor. V. Zayas.

Research methods are the tools that allow psychologists to test the validity of hypotheses. This course provides a survey of the methods used by scientists in personality and social psychology as well as related behavioral sciences to empirically test hypotheses. Specifically, this course will discuss the following topics: (i) philosophy of science, (ii) research designs and methods, (iii) data collection, analysis, and validity, (iv) report writing, and (v) recurrent and emerging trends and issues in the field of research methods and quantitative analysis. Students concentrate on completing a small research project in which they conduct an experiment, interpret its data, and write up the results.

[PSYCH 4920 Sensory Function (also BIONB 4920, PSYCH 6920) (PBS)]

Spring. 4 credits. Limited to 25 students. Prerequisite: 3000-level neuroscience course, or BIONB 2220 or BIOAP 3110, or equivalent; knowledge of elementary physics, chemistry, and behavior. S-U or letter grades. Graduate students, see PSYCH 6920. Offered alternate years; next offered 2010-2011. B. P. Halpern and H. C. Howland.

In general, this course has covered classical topics in sensory function such as vision, hearing, touch, and balance, as well as some more modern topics like sensory processing, location of stimulus sources in space, the development of sensory system, and nonclassical topics such as electroreception and internal chemoreceptors.]

PSYCH 5310 Consciousness and Free Will (also BIONB 4330, COGST 4310)

Spring. 4 credits. Prerequisite: COGST/INFO/PSYCH 2140/6140. S. Edelman. For description see COGST 4310.

Advanced Courses and Seminars

Advanced seminars are primarily for graduate students, but with the permission of the instructor they may be taken by qualified undergraduates. The selection of seminars to be offered each semester is determined by the needs of the students.

A supplement describing these advanced seminars is available at the beginning of each semester and can be obtained from the department office (211 Uris Hall). The following courses may be offered either semester and carry 4 credits unless otherwise indicated.

PSYCH 6000 General Research Seminar**PSYCH 6050 Perception (also PSYCH 2050)**

Fall. 4 credits. Non-arts graduate students only. J. E. Cutting.

PSYCH 6100-6110 Perception**PSYCH 6120 Perception Lunch Seminar**

Spring and fall. J. Cutting.

PSYCH 6121 Laboratory in Cognition and Perception (also PSYCH 4120)

Spring. 4 credits. D. J. Field.

PSYCH 6140 Cognitive Psychology (also COGST/PSYCH 2140, COGST 6140)

Spring. 4 credits. S. Edelman.

PSYCH 6180 Psychology of Music (also MUSIC 4181, PSYCH 4180)

Fall. 4 credits. C. Krumhansl.

PSYCH 6181 Topics in Psycholinguistics**PSYCH 6200 Advanced Neurobiology and Memory**

Spring. 3 credits. D. Smith.

PSYCH 6210 Behavioral and Brain Sciences

Fall and spring. 4 credits each semester.

PSYCH 6220 Topics in Perception and Cognition**PSYCH 6230 Navigation, Memory, and Context: What Does the Hippocampus Do? (also PSYCH 4230)**

Spring. 4 credits. D. Smith.

[PSYCH 6250 Cognitive Neuroscience (also PSYCH 4250)]

Fall. 4 credits. Next offered 2010-2011. B. L. Finlay.]

PSYCH 6270 Evolution of Language (also COGST/PSYCH 4270)

Fall. 3 credits. M. Christiansen.

PSYCH 6271 Topics in Biopsychology

Fall or spring. Staff.

- [PSYCH 6280 Connectionist Psycholinguistics (also COGST/PSYCH 4280, LING 4428/6628)]**
Fall. 3 credits. Next offered 2010–2011. M. Christiansen.]
- PSYCH 6290 Olfaction and Taste: Structure and Function (also BIONB/PSYCH 4290)**
Spring. 4 credits. B. P. Halpern.
- [PSYCH 6300 Moral Reasoning (also PSYCH 4300)]**
Fall. 4 credits. Next offered 2010–2011. D. Pizarro.
For description, see PSYCH 4300.]
- PSYCH 6310 Effects of Aging on Sensory and Perceptual Systems (also BIONB 4210, PSYCH 4310)**
Fall. 4 credits. B. P. Halpern.
- PSYCH 6320 Biopsychology of Learning and Memory (also BIONB 3280, PSYCH 3320)**
Spring. 4 credits. T. J. DeVoogd.
- PSYCH 6340 Sensory Construction (also PSYCH 4340)**
Spring. 3 credits. T. Cleland.
- PSYCH 6350 Evolutionary Perspectives on Behavior**
- PSYCH 6400 To Sleep, Dream, and Remember (also PSYCH 4400)**
Fall. 4 credits. H. S. Porte.
- PSYCH 6410 Laboratory in Sleep Research (also PSYCH 4410)**
Spring. 4 credits. H. S. Porte.
- PSYCH 6420 Human Perception: Applications to Computer Graphics, Art, and Visual Display (also PSYCH/COGST 3420, VISST 3342)**
Fall. 4 credits. D. J. Field.
- PSYCH 6430 Statistics in Current Psychological Research**
- [PSYCH 6500 Special Topics in Cognitive Science (also COGST 5500)]**
- PSYCH 6520 Trauma and Treatment (also PSYCH 4520)**
Fall. 4 credits. S. Bem.
- PSYCH 6650 Topics in High-Level Vision (also PSYCH/COGST 4650)**
Spring. 4 credits. Offered alternate years. S. Edelman.
- [PSYCH 6780 Parenting and Child Development (also PSYCH 4780, HD 4440)]**
Fall. 4 credits. Next offered 2010–2011. M. Goldstein.]
- PSYCH 6800 Experimental Social Psychology**
- PSYCH 6810 Advanced Social Psychology (also PSYCH 4810)**
Fall. 4 credits. D. T. Regan.
- PSYCH 6820 Automaticity (also PSYCH 4820)**
Spring. 4 credits. M. Ferguson.
- PSYCH 6830 Affects and Cognition**
Fall. 4 credits. A. M. Isen.
- PSYCH 6850 The Self (also PSYCH 4850)**
Spring. 4 credits. D. Dunning.
- PSYCH 6910 Research Methods in Psychology (also COGST/PSYCH 4910)**
Spring. 4 credits. V. Zayas.

[PSYCH 6920 Sensory Function (also BIONB/PSYCH 4920)]
Spring. 4 credits. Offered alternate years, next offered 2010–2011. B. P. Halpern and H. C. Howland.]

[PSYCH 6960 Introduction to Sensory Systems (also BIONB/PSYCH 3960)]
Spring. 4 credits. Next offered 2011–2012. B. P. Halpern.]

PSYCH 7000 Research in Biopsychology

PSYCH 7090 Developmental Psychology (also PSYCH 2090)
Spring. 4 credits. M. Goldstein.

PSYCH 7100 Research in Human Experimental Psychology (also COGST 7100)

PSYCH 7130 Information Processing: Conscious and Nonconscious
Spring. 4 credits. R. Staff.

PSYCH 7160 Auditory Perception (also PSYCH 3160)
Spring. 4 credits. C. L. Krumhansl.

PSYCH 7200 Research in Social Psychology and Personality

[PSYCH 7220 Hormones and Behavior (also BIONB/PSYCH 3220)]
Fall. 4 credits. Next offered 2010–2011. E. A. Regan.]

PSYCH 7260 Learning Language (also COGST/PSYCH 4260)
Spring. 4 credits. S. Edelman.

PSYCH 7750 Proseminar in Social Psychology I

Fall. 2 credits. Limited to 10 students. Prerequisite: graduate students in social psychology; permission of instructors. D. Dunning, M. Ferguson, T. Gilovich, D. Pizarro, and D. Regan.

First semester of a yearlong discussion-seminar course intended to give graduate students an in-depth understanding of current research and theory in social psychology. Emphasizes social cognition, but other topics, such as group dynamics, social influence, the social psychology of language, and emotional experience, are covered.

PSYCH 7760 Proseminar in Social Psychology II

Spring. 2 credits. Limited to 10 students. Prerequisite: graduate students in social psychology; permission of instructors. D. A. Dunning, M. Ferguson, T. D. Gilovich, D. Pizarro, and D. T. Regan.

Second semester of a yearlong discussion-seminar course intended to give graduate students an in-depth understanding of current research and theory in social psychology. Emphasizes social cognition, but other topics, such as group dynamics, social influence, the social psychology of language, and emotional experience are covered.

PSYCH 9000 Doctoral Thesis Research in Biopsychology

PSYCH 9100 Doctoral Thesis Research in Human Experimental Psychology

PSYCH 9200 Doctoral Thesis Research in Social Psychology and Personality

Summer Session Courses

The following courses are also frequently offered in the summer session, though not necessarily by the same instructor as during

the academic year. Not all of these courses are offered in a particular summer. Information regarding these courses and additional summer session offerings in psychology is available from the department before the end of the fall semester.

PSYCH 1101 Introduction to Psychology: The Frontiers of Psychological Inquiry

PSYCH 1102 Introduction to Cognitive Science

PSYCH 1128 Introduction to Psychology: Personality and Social Behavior

PSYCH 1990 Sports Psychology

PSYCH 2230 Introduction to Biopsychology

PSYCH 2800 Introduction to Social Psychology

PSYCH 3500 Statistics and Research Design

RELIGIOUS STUDIES MAJOR

D. Boucher, director; A. Blackburn, R. Brann, C. M. Carmichael, A. Chignell, K. Clinton, L. Donaldson, J. Fajans, D. Fredericksen, D. Gold, S. Greene, K. Haines-Eitzen, J. S. Henderson, T. D. Hill, T. J. Hinrichs, D. Holmberg, P. R. Hyams, W. J. Kennedy, J. M. Law, S. MacDonald, K. S. March, L. Monroe, R. L. Moore, D. I. Owen, D. S. Powers, C. Robinson, P. S. Sangren, S. Toorawa, M. Washington, A. Willford

The Religious Studies Program, an academic unit providing a major in the scholarly study of religion, offers a wide variety of courses addressing various approaches to, and topics in, the study of religion.

The Religious Studies Program is designed to meet the needs of three classes of students: (1) students planning to pursue advanced degrees in the academic study of religion or allied disciplines or subdisciplines (e.g., history of religions, religion and literature, religion and psychology, ethics, theology, area studies); (2) students seeking courses on topics relating to religion to fulfill distribution requirements; and (3) students desiring a more systematic exposure to the academic study of religion as a significant component of a liberal arts education. To all students, our program offers an excellent opportunity to develop a deeper understanding and appreciation of the complex ways in which religious traditions inform human thought and behavior. The courses offered through our program are built on the established scholarly tradition of the study of religion as an academic, as opposed to confessional, pursuit. Religious traditions are explored in all of their complexity through comparative, contextual (in specific historical or cultural contexts), and thematic studies.

The program also hosts lecture series, conferences, symposia, and periodic social gatherings for faculty members and students throughout the academic year to foster a sense of intellectual community.

The Major in Religious Studies

Signing into the major: To sign into the major in Religious Studies, a student must have completed at least one course in

Religious Studies before scheduling an appointment with the program director. Here is the process:

1. Schedule an appointment with the director of the Religious Studies Program, whose name and e-mail address can be found on the Religious Studies web site.
2. In addition to a copy of the current Cornell transcript (the informal one students regularly receive is acceptable), students should bring to their meeting with the director all of these forms, available in the Religious Studies office, 409 White Hall:
 - a. a completed Religious Studies major application form
 - b. a proposed "course of study," which will be used as a guide in the student's conversation with the director and revised for formal submission to the program upon your entrance as a major
 - c. a College of Arts and Sciences advisor/major form, which will be signed by the director and advisor. The advisor will be assigned in the student's meeting with the director based on interest.

Advising in the Religious Studies

Program: Upon entering the major in Religious Studies, a student is assigned a faculty advisor whose area of expertise most closely matches the proposed interest of the student. An up-to-date approved advisor list is available in the Religious Studies office. Note that not all faculty members who cross-list courses with RELST can serve as RELST advisors. Working closely with one's RELST advisor when selecting courses is an important component of this program, enabling students to fulfill the requirements for the major while creating an integrated and coherent course of study out of our large number of multidisciplinary course offerings.

To graduate as a major in Religious Studies, a student must (1) complete with letter grades the program's three core courses, RELST 2250 Introduction to Asian Religions, RELST 2651 Holy War, Crusade and Jihad, and RELST 4449 History and Methods of the Academic Study of Religion; and (2) complete with letter grades seven additional courses approved for the major.

Students must complete 10 courses cross-listed with Religious Studies:

Three Core Courses:

RELST 2250 Introduction to Asian Religions

RELST 2651 Holy War, Crusade and Jihad

RELST 4449 History, Theory, and Methods in the Academic Study of Religion

The requirement for either or both RELST 2250/2651 may be satisfied by taking two or more courses in the relevant traditions with some attention to breadth:

The requirement for RELST 2250 may be satisfied by taking at least one course on South Asian traditions AND one course on East Asian traditions.

The requirement for RELST 2651 may be satisfied by taking at least one course in each of two or more of the traditions of Near Eastern origin (Judaism, Christianity, and Islam).

Absolutely no student will be exempted from RELST 4449.

Seven Additional Courses

In selecting their additional courses for the major, students are expected to consult closely with their advisors to ensure that their programs have adequate breadth in Religious Studies generally and depth in a particular tradition, cultural area, or approach to the field.

Most courses approved for the major are offered by cooperating departments within the College of Arts and Sciences. A comprehensive up-to-date list of these courses is maintained at the office of the Religious Studies Program, 409 White Hall.

Graduating with Honors in Religious Studies:

General Information

1. **Eligibility.** 3.0 cumulative average and 3.5 average inside the major with no grade in the major below B-. Program director notifies eligible candidates during the spring semester of the junior year or before commencement of final year.
2. **Honors Courses.** Candidates must sign into RELST 4995 Senior Honors Essay for 8 credits (two courses) for two semesters. After the first semester, an R in the transcript indicates that this course (usually for 8 credits) is a yearlong course. When the project is completed at the end of the second semester, the grade recorded counts for all 8 credits. (The 8-credit limit is the result of the conviction that earning more than 8 credits for a single piece of one's undergraduate education is unwise.)

The student submits the honors proposal (with and according to the program's instruction/cover sheet) to the Religious Studies administrator before the end of the spring semester of the junior year, or not later than Sept. 15 of the final year. The administrator then approves the student's signing into the honors courses.

3. **Honors Committee—three faculty members.** While students are required to have three faculty members on their committee at the time of the submission of the final draft, only two of them must be identified when the proposal is submitted. In the event the advisor is on leave, the program will assign a committee member from the list of approved RELST advisors. The three members should be:
 - a. The professor who has agreed to work closely with the student over the year and to be the supervisor/grader of the project is chair of the committee.
 - b. The student's Religious Studies major advisor (required)
 - c. Another knowledgeable faculty member
 Sometimes the advisor is the supervisor/chair. If that is the case, the student needs two additional knowledgeable professors for the committee of three.

Courses Approved for the Major Sponsored by Religious Studies

[RELST 2110 Black Religious Traditions: Sacred and Secular (also AMST/HIST 2110) (HA-AS)]

Spring 4 credits. M. Washington.]

RELST 2204 Introduction to Qu'ranic Arabic (also ASRC 2106, NES 2204)

Spring. 4 credits. H. Al-Masri.

For description, see NES 2204.

RELST 2250 Introduction to Asian Religions (also ASIAN 2250) @ # (HA-AS)

Spring. 3 credits. D. Boucher.

For description, see ASIAN 2250.

RELST 2277 Meditation in Indian Culture (also ASIAN 2277) @ # (CA-AS)

Spring. 3 credits. D. Gold.

For description, see ASIAN 2277.

[RELST 2420 Religion and Politics in American History (also HIST/AMST 2420) (HA-AS)]

4 credits. Limited to 15 students.

Prerequisite: permission of instructor. Next offered 2010-2011. L. Moore.

For description, see HIST 2420.]

RELST 2611 Prophecy in Ancient Israel (also JWST/NES 2611)

Spring. 3 credits. L. Monroe.

For description, see NES 2611.

RELST 2629 Intro to the New Testament (also CLASS 2613, JWST/NES 2629) @ # (HA-AS)

Spring. 3 credits. K. Haines-Eitzen.

For description, see NES 2629.

RELST 2630 Religion and Reason (also PHIL 2530) (KCM-AS)

Spring. 4 credits. S. MacDonald.

For description, see PHIL 2530.

RELST 2655 Intro to Islamic Civilization (also HIST 2530, NES 2655) @ # (HA-AS)

Fall. 3 credits. D. Powers.

For description, see NES 2655.

RELST 2724 Introduction to the Hebrew Bible (also JWST/NES 2724) @ # (LA-AS)

Fall. 3 credits. L. Monroe.

For description, see NES 2724.

RELST 3212 Qur'an and Commentary (also NES 3212) @ # (LA-AS)

Spring. 4 credits. D. Powers.

For description, see NES 3212.

RELST 3230 Myth, Ritual, and Symbol (also ANTHR 3420) @ (CA-AS)

Spring. 4 credits. D. Holmberg.

For description, see ANTHR 3420.

RELST 3260 Christianity and Judaism (also COML 3260) # (LA-AS)

Spring. 4 credits. C. Carmichael.

For description, see COML 3260.

RELST 3309 Temple in the World: Buddhism in Contemporary South and Southeast Asia (also ASIAN 3309)

Spring. 3 credits. A. Blackburn.

For description, see ASIAN 3309.

RELST 3351 Indian Religious Worlds (also ASIAN 3351) @ (CA-AS)

Spring. 4 credits. D. Gold.

For description, see ASIAN 3351.

RELST 3353 Mysticism in Chinese Religions (also ASIAN 3353) @ # (CA-AS)

Fall. 4 credits. D. Boucher.
For description, see ASIAN 3353.

RELST 3359 Japanese Buddhism (also ASIAN 3359) @ # (HA-AS)

Spring. 4 credits. J. M. Law.
For description, see ASIAN 3359.

RELST 3460 Modernization of the American Mind (also AMST/HIST 3460) (HA-AS)

Fall. 4 credits. L. Moore.
For description, see HIST 3460.

RELST 3588 Biblical Archaeology (also JWST/NES 3588)

Spring. 4 credits. L. Monroe.
For description, see NES 3588.

RELST 3629 Intro to the New Testament (also CLASS/JWST/NES 3629)

Spring. 1 credits. K. Haines-Eitzen.
For description, see NES 3629.

RELST 3635 Christianization of the Roman World (also CLASS/HIST/NES 3625) @ # (HA-AS)

Fall. 4 credits. E. Rebillard.
For description, see CLASS 3625.

RELST 3677 Search for the Historical Mohammad (also HIST/NES 3677)

Spring. 4 credits. D. Powers.
For description, see NES 3677.

RELST 3731 Religion and Society in Early Modern Europe (also HIST 3731) # (HA-AS)

Spring. 4 credits. D. Corpis.
For description, see HIST 3731.

RELST 4100 Latin Philosophical Texts (also PHIL 4002)

Spring. Variable credits. S. MacDonald and C. Brittain.
For description, see PHIL 4002.

RELST 4102 Biblical Hebrew: Genesis (also JWST/NES 4102) @ # (LA-AS)

Fall. 4 credits. L. Monroe.
For description, see NES 4102.

RELST 4260 New Testament Seminar (also COML 4260) # (HA-AS)

Spring. 4 credits. C. Carmichael.
For description, see COML 4260.

RELST 4404 Japanese Buddhism: Experience and Ideology (also ASIAN 4405)

Spring. 4 credits. J. M. Law.
For description, see ASIAN 4405.

RELST 4427 Buddhist Monasticism (also ASIAN 4427) @ # (CA-AS)

Fall. 4 credits. D. Boucher.
For description, see ASIAN 4427.

RELST 4438 Monks, Texts, and Relics: Transnational Buddhism in South and Southeast Asia (also ASIAN 4438/6638) (CA-AS)

Spring. 4 credits. A. Blackburn.
For description, see ASIAN 4438.

RELST 4449 History and Methods of the Academic Study of Religion (also ASIAN 4449) # (KCM-AS)

Spring. 4 credits. Requirement for Religious Studies majors. J. M. Law and D. Boucher.
For description, see ASIAN 4449.

[RELST 4460 Indian Meditation Texts (also ASIAN 4460) @ # (KCM-AS)

Fall. 4 credits. Next offered 2010–2011.
D. Gold.
For description, see ASIAN 4460.]

RELST 4489 Religion and Sustainability (also ASIAN 4489)

Fall. 4 credits. A. Blackburn.
For description, see ASIAN 4489.

RELST 4639 Readings in Arabic Historical Texts (also NES 4639) @ # (HA-AS)

Spring. 4 credits. D. Powers.
For description, see NES 4639.

[RELST 4821 Religious and Secular in American Culture (also AMST/HIST 4821) (HA-AS)

Fall. 4 credits. Next offered 2010–2011.
L. Moore.
For description, see HIST 4821.]

RELST 4823 Secular Disaffections: On Islam and the Politics of Emotion (also COML 4066, NES 4923, SHUM 4823)

Fall. 4 credits. R. Mas.
For description, see SHUM 4823.

RELST 4931 Vitality and Power in China (also HIST/SHUM 4931, STS 4911)

Spring. 4 credits. T. J. Hinrichs.
For description, see SHUM 4931.

RELST 4990–4991 Directed Study

4990, fall; 4991, spring. 2–4 credits each semester. For majors in Religious Studies; permission of director required. Staff.

RELST 4995 Senior Honors Essay

Fall and spring (two semesters). 8 credits. Requirement for honors in Religious Studies. Staff.

RELST 6020 Latin Philosophical Texts (also PHIL 6020)

Fall. 4 credits. S. MacDonald and C. Brittain.
For description, see PHIL 6020.

ROMANCE STUDIES

G. Aching, T. Alkire, S. Amigo-Silvestre, M. Balsa (visiting), M. Baraldi, K. Bättig von Wittelsbach, M. Beviá, T. Beviá, B. Bosteels, T. Campbell, F. Cervesi, D. Castillo, D. Cruz de Jesús (associate chair), J. Culler (chair), L. Dubreuil, T. Fallman, D. Fieni (visiting), M. A. Garcés, M. Greenberg, L. Horne, C. Howie, P. Keller, R. Klein, C. Lawless, S. LoBello, K. Long, J. Luks, N. Maldonado-Méndez, T. McNulty, M. Migiel, J. Oliveira, J. E. Paz-Soldán, S. Pinet, M. K. Redmond, J. M. Rodríguez-García, J. Rautier-Pucci, K. Serafin, C. Sparfel, A. Stratakos-Tiö, B. Teutli, S. Tun, M. C. Vallois, C. Waldron, R. Welch (visiting). Emeriti: C. Morón Arroyo, J. Béreaud, A. Colby-Hall, N. Furman, A. Grossvogel, P. Lewis, A. Seznec. Adjunct Professor, Anne Berger, Adjunct Associate Professor: S. Tarrow.

The Department of Romance Studies offers courses in the following areas: French, Hispanic, Italian, and Luso-Brazilian literatures; French, Italian, Portuguese, and Spanish language; Francophone, Italian, Luso-Brazilian, and Hispanic cultures; and linguistics and semiotics. Through its course offerings and opportunities for independent study, the department seeks to encourage study of the

interactions of the Romance literatures among themselves, with other literatures, and with other fields of inquiry.

French

T. Alkire, L. Dubreuil, D. Fieni (visiting), M. Greenberg, C. Howie, R. Klein, S. LoBello, K. Long, J. Luks, T. McNulty, C. Sparfel, S. Tun, M. C. Vallois, C. Waldron. Emeriti: J. Béreaud, A. Colby-Hall, N. Furman, D. I. Grossvogel, P. Lewis, A. Seznec. Adjunct Professor, Anne Berger, Adjunct Associate Professor: S. Tarrow

The Major

French is a national language in 28 countries, and spoken widely in at least 18 more. The French brought the world the Bayeux Tapestry (arguably the world's first comic strip), Versailles, Impressionism, Surrealism, New Wave cinema, Poststructuralist Theory, and many other movements and works that have been influential for world culture.

The French major is designed to give students a core knowledge of the literature and culture of France and of Francophone countries, as well as a familiarity with the French language, all in a program flexible enough to suit each student's own interests. The program is designed to guide students through introduction to literature and culture, and surveys that further enhance their expertise and knowledge of the field, to advanced courses that allow them to pursue their specific interests in a more intense fashion. Working closely with an advisor, the student will be able to shape a coherent program that combines coverage of significant fields with a specialized interdisciplinary, theoretical, or cultural focus. The program is designed to hone research and analytical skills, as well as language skills.

The prerequisites for the French major are FREN 2190 (French Intermediate Composition and Conversation II) and FREN 2210 (Reading, Looking, Thinking: Introduction to Interpretation). Students admitted to the major are expected to take FREN 3210 (Readings in Modern Literature and Culture) and FREN 3220 (Readings in Early Modern Literature and Culture). They will then take six more courses to complete the major: an advanced language course (3010 or 3050, or above), and five literature or culture courses. Two of these literature/culture courses can be taken in related fields, if the course has a significant French component: French History, Art History, Government, Sociology, Linguistics, Philosophy, Visual Studies, etc.

Students are encouraged to study abroad, through Cornell-sponsored or Cornell-approved programs, such as EDUCO in Paris. When appropriate, this work can be counted toward the required course work for the major. Students should consult with the DUS of Romance Studies, the Study Abroad advising dean, and Cornell Abroad, as well as with their faculty advisor, before taking courses abroad, to assure that they are appropriate.

Outline of the French Major

Prerequisites

- (1) FREN 2190
- (2) FREN 2210
- (3) Advanced Language course—3010, 3050, or above (depending on placement)

Core Courses

- (4) FREN 3210
 (5) FREN 3220

Other Courses (at least five more courses)

- (6, 7, and 8)

Three of these courses must be in French (either taught in Romance Studies or in a Cornell-approved study abroad program in a Francophone country) AND be on French or Francophone subjects. Only courses above the level of FREN 3130 can count towards the major.

- (9 and 10)

Two courses may be in English and/or in related fields (History, Art History, Government, Anthropology, Sociology, etc.): 50 percent of the subject matter in these courses must be related to France or Francophone cultures (French history, etc.).

One of these courses must be on pre-1789 literature or culture, one must be on Francophone literature or culture, and one must be at the 4000 level. Please note that in some cases, one course may cover two of these requirements (for example, a 4000-level course may also be on a pre-1789 topic, such as Medieval or Early Modern literature).

Administration of the French Major

Students are admitted to the major by the director of undergraduate studies but are guided by their individual advisors. A copy of each student's progress is given to the director of undergraduate studies for approval and safe-keeping.

Minor in French Studies

Its purpose is to supplement a student's major with a complementary focus or concentration that is indicated on the graduate's transcript. The minor in French Studies, organized by the interdisciplinary Program in French Studies, is designed to be compatible with all kinds of majors and is open to students in all the undergraduate colleges. The minor promotes broad understanding of French culture, as well as Francophone literatures, societies, and their political/economic systems; it also encourages students to refine and practice their language skills. Students pursuing the minor must attain proficiency (by taking a placement exam or completing a 2000-level course in French) and must take the core course The French Experience (FREN 2240) or an approved equivalent of the core course (approved alternatives will be listed on the program web site). Students may also petition the program director to use an advanced course conducted in French as their core course. Completion of the Minor requires, in addition to the core, three non-language courses on French and Francophone topics. Only one of the four courses required for the minor can be taken S-U.

Applications for the minor are accessible at the French Studies web site, www.einaudi.cornell.edu/french-studies/about/index.asp and should be submitted to the Department of Romance Studies (303B Morrill Hall) or to Callean Hile at chl2@cornell.edu.

Study Abroad in France

French majors or other interested students may study in France for one or two semesters during their junior year. Opting for one of several study-abroad plans recognized by the Department of Romance Studies facilitates the transfer of credit. Information about these plans is available from the director of undergraduate studies.

Students must be Cornell undergraduates with a strong academic record. The minimum French preparation is the completion of FREN 2190 or its equivalent in advanced credit or placement by the Cornell CASE examination. Taking FREN 3010 or 3050, or even 3120 or 3130 is, however, strongly recommended. Students interested in Studying in France are encouraged to consider the special benefits offered by EDUCO, the program in Paris cosponsored by Cornell, Emory, and Duke Universities. EDUCO offers advanced students a challenging course of study and the experience of total immersion in French life and culture in Paris. Participants in this program may spend the year or semester as fully matriculated students at the Universities of Paris VII or IV and other institutions of higher learning in Paris, including the possibility of study at the Institut d'Etudes des Sciences Politiques (Sciences Po), selecting courses in many fields from the regular university course offerings. Students begin the academic year with an intensive three-week orientation in French history, society and daily life. While it is possible to enroll in the EDUCO Program for one semester, admission will be offered first to students planning to study abroad for the full academic year.

EDUCO maintains a center in Paris with full support staff. The resident director, chosen annually from the Cornell, Emory, and Duke faculties, teaches a special seminar each semester, provides academic advice, and helps ensure the quality of the courses. The center, which includes a small library and word-processing facilities, is regularly used by students for special tutorials, seminars, and lectures, as well as informal gatherings.

Honors. The honors program encourages well-qualified students majoring in French literature and culture to do independent work in French beyond the required course work for the major. The preparation of the senior honors essay, generally spread over two semesters, provides a unique learning opportunity, since it allows for wide reading and extensive rewriting to a degree not possible in the case of course papers.

To be eligible for honors, students must have a general grade point average of at least 3.00 and a grade point average of at least 3.5 in the French major.

No special seminars or courses are required of honors students, but they will have regular meetings with the faculty advisors who have agreed to supervise their work. They may receive course credit by enrolling in FREN 4290-4300, but these independent study courses must be taken in addition to the courses that meet the minimum requirements for the major. At the end of the senior year, each honors student is examined orally on the honors essay by a jury consisting of his or her faculty advisor and two other faculty members. The senior essay is to be made available for reading by the jury on or before April 15. The awarding of honors is

determined by the student's grades in the major and the quality of the honors essay.

Courses in the French Program

Enrollment in a language course is conditional upon the student's eligibility for the particular level and on attendance at the first scheduled class session. Because of the high demand for language courses, a student who fails to attend the first class meeting will be dropped so others may register.

Note: Students placed in the 2000-level course have the option of taking language and/or literature courses.

FREN 1210-1220 Elementary French

1210, fall; 1220, spring. 4 credits each term. Students who have previously studied French must have an LPF score lower than 37, or SAT II lower than 410, to be eligible for FREN 1210. Prerequisite for 1220: LPF score 37-44 or SAT II 410-480, FREN 1210. S. Tun (course coordinator) and staff. FREN 1210-1220 is a two-semester sequence of courses designed to provide a thorough grounding in French language and an introduction to intercultural competence as preparation for real-world application or eventual work in literary and/or cultural studies. Classes provide context- and genre-specific practice in speaking, listening, reading, writing, as well as analytical skills for grammar, with the goal of helping students to develop the necessary tools to become independent language learners.

FREN 1230 Continuing French

Fall or spring. 4 credits. Prerequisite: FREN 1220 or an LPF score of 45-55 or SAT II 490-590. Recommended courses after FREN 1230: FREN 2060 or 2090. C. Waldron (course coordinator) and staff. FREN 1230 is an all-skills course designed to improve pronunciation, oral communication, and reading ability; to establish a groundwork for correct writing; and to provide a substantial grammar review. The approach in the course encourages the student to see the language within the context of its culture.

FREN 2060 French Intermediate Reading and Writing

Fall or spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: FREN 1230, LPF score 56-64, or SAT II 600-680. Conducted in French. Recommended courses after FREN 2060: FREN 2100, 2190 or 2210. Students who have taken FREN 2060 are not eligible to take FREN 2090 for credit. S. Tun.

This language course is designed for students who want to focus on their reading and writing skills. Emphasis is placed on grammar review and expansion, vocabulary development, and appreciation of different styles of language. Diverse text types are used, including a contemporary novel and student-selected material.

FREN 2090 French Intermediate Composition and Conversation I

Fall, spring, or summer. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: FREN 1230, LPF score 56-64, or SAT II 600-680. Recommended courses after FREN 2090: FREN 2100, 2190, or 2210. Students who have taken FREN 2090 are not eligible to take FREN 2060 for credit. C. Sparfel (course coordinator) and staff; summer: C. Waldron.

This intermediate-level course is designed for students who want to focus on their speaking and writing skills. Emphasis is placed on strengthening of grammar skills, expansion of vocabulary and discourse levels to increase communicative fluency and accuracy. The course also provides continued reading and listening practice as well as development of effective language learning strategies.

FREN 2100 Pronunciation of Standard French

Spring. 3 credits. **This course cannot serve to fulfill the language requirement.** Prerequisites: FREN 2060 or higher, or CASE Q+. T. Alkire.

This intermediate-level course focuses on accent reduction. Students will learn how to transcribe French sounds while simultaneously engaging in systematic listening and pronunciation exercises. The exercises target vowels, consonants and basic intonational patterns. Expressive intonation may be addressed near the end of the semester if time permits. Class work will include memorization of short dialogues and scenes from films. Students will achieve better pronunciation, greater fluency, and increased self-assurance in spoken French by the end of the course.

FREN 2190 French Intermediate Composition and Conversation II

Fall or spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: FREN 2060 or 2090 or Q+ on the Cornell Advanced Standing Examination (CASE). Taught in French. FREN 2210 may be taken concurrently with 2190. Recommended courses after FREN 2190: FREN 2210, 3010, or 3050. S. LoBello (course coordinator) and staff.

This course emphasizes conversation based on short stories, poems, a play, a novel, newspaper articles, short videos and oral presentations by students. Improving grammatical accuracy and enriching vocabulary in oral and written expression of French occur in the lively classroom discussions, as well as through written and oral analyses of the readings, compositions on student-selected topics, and through grammar review. Themes and emphases may vary from section to section.

FREN 2210 Reading, Looking, Thinking: Introduction to Interpretation (LA-AS)

Fall or spring. 3 credits. *Satisfies Option 1 of language requirement.* Prerequisite: FREN 2060 or 2090 or CASE Q+. Conducted in French. Fall: T. McNulty and staff; spring: M. C. Vallois and staff.

Designed to introduce students to methods of textual analysis, through reading and discussion of works in various genres (narrative prose, drama, poetry) from the French and Francophone world. Emphasizes the development of analytical skills, in particular close readings by a variety of authors from different periods.

FREN 2240 The French Experience (CA-AS)

Fall. 4 credits. Conducted in English. L. Ferri.

An examination of French society, economy, and institutions through key moments in a long history, in order to figure out what made French culture so distinctive—even though some have claimed recently that the “French cultural exception is dead.” Looking attentively at texts and contexts (the bibliography will

include, e.g., Yves Lacoste’s *Vive la nation!/ Long Live the Nation*, Jonathan Nossiter’s documentary film *Mondovino*, Mehdi Belhaj Kacem’s *La Psychose française, les banlieues*, and Ariel Kenig’s *Quitter la France/leaving France*, we will move beyond clichés, and attempt to understand how post-imperial France tries to adapt to the complex processes known as globalization and multiculturalism without losing its “national identity.” Special attention will be paid to the construction of Europe and to the notions of “European citizenship” and “European model.” Taught in English. Mandatory readings in French (book chapters, newspapers, an oral presentation in English or French, and a final paper (8,000 characters) in English.

FREN 3010 Advanced French Composition and Conversation

Fall or spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: FREN 2190 or Q++ on the Cornell Advanced Standing Examination (CASE). Recommended courses after FREN 3010: FREN 2210, 3120, or above. FREN 2210 may also be taken concurrently with 3010. Students who have taken FREN 3050 are not eligible to take FREN 3010 for credit. Either FREN 3010 or 3050 is required for the major. S. LoBello (course coordinator) and staff.

In this course, oral communication skills, writing practice, and a comprehensive review of fundamental grammatical structures are integrated with the reading of short stories and articles on current events taken from French magazines or newspapers, chosen for thematic or cultural interest. Students write weekly papers (essays or translations) and give at least one oral presentation in class.

FREN 3050 Advanced French through Film

Fall or spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: FREN 2190 or Q++ on the Cornell Advanced Standing Examination (CASE). Recommended courses after FREN 3050: FREN 2210, 3120 or above. FREN 2210 may also be taken concurrently with 3050. Students who have taken FREN 3010 are not eligible to take FREN 3050 for credit. Either FREN 3050 or FREN 3010 is required for the major. C. Waldron.

This language course provides students with opportunities to further develop their written and oral communication, as well as their listening and reading skills, through the use of French contemporary films, related readings, and presentations by guest speakers. Particular emphasis is given to the cultural and historical context within viewed films, as it relates to contemporary French society.

FREN 3120 Advanced French Stylistics

Fall. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: FREN 3010 or 3050, or Q++ on the Cornell Advanced Standing Examination (CASE). Students who have taken FREN 3130 are not eligible to take FREN 3120 for credit. T. Alkire.

This course on stylistics and translation aims to help students develop a richer, more nuanced and idiomatic command of both the spoken and written language. Systematic study of grammar is discontinued as more attention is devoted to topics such as descriptive and prescriptive stylistics, authorial style, varieties of spoken and written French and their

literary representations, rhetorical figures, poetics, as well as translation theory and textual analysis. Writing exercises include pastiche, précis, explication de texte, an exercise de style, and theme. Additional exercises will target vocabulary development. Seminar-style participation in class discussions is expected, as are two oral presentations.

FREN 3130 Advanced French through News

Spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: FREN 3010 or 3050, or placement by Cornell Advanced Standing Examination (CASE). Students who have taken FREN 3120 are not eligible to take FREN 3130 for credit. C. Waldron.

This course prepares students for interacting at an advanced level of proficiency in both speaking and writing. Students will increase their vocabulary and knowledge of idiomatic French, while discussing and debating topics of current interest as they are presented in French televised news broadcasts and other media. A flexible approach allows students to improve their language skills on an individualized basis.

FREN 3210 Readings in Modern French Literature and Culture (LA-AS)

Fall. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisites: FREN 2210, 3010, or 3050, or CASE Q++ placement. Conducted in French. L. Dubreuil.

This course is designed to teach ways of reading and understanding works created from the Romantic period to the present day, in their cultural context. A range of texts from various genres is presented, and students refine their analytical skills and their understanding of various methodologies of reading. Texts by authors such as Balzac, Baudelaire, Cixous, Duras, Genet, Mallarmé, Michaux, Proust, Rimbaud, Sarraute, Sartre.

FREN 3220 Readings in Early Modern French Literature and Culture (LA-AS)

Spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: FREN 2210, 3010, or 3050, or CASE Q++ placement. Conducted in French. M. Greenberg.

This course is designed to familiarize students with works from the Renaissance, the Classical period, and the Enlightenment, as well as the cultural and historical context in which these texts are created, reflecting a dynamic period of significant change for France. Texts by such authors as Ronsard, du Bellay, Montaigne, Molière, Marguerite de Navarre, Corneille, Diderot, de Lafayette, Racine, Perrault, Rousseau. Students may read texts in the original languages or in translation.

FREN 3280 Medieval Francophone Literature

Fall. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisites: FREN 2210, 3010, or 3050, or CASE Q++ placement. C. Howie.

This course is dedicated to examining how medieval French literature was never really French in the first place. There was, after all, no political entity commensurate with modern France in the Middle Ages, and no unifying language with the symbolic power that French has, for better or worse, acquired in modernity. Nonetheless, linguistic differences mattered, and these differences were often

also political ones, distinguishing north from south and centers from margins. Through close readings of Anglo-Norman, Franco-Italian, and Occitan texts, including narratives of colonial conquest and cultural traffic, we'll have a chance to examine the porous boundaries of the medieval Francophone world. Primary texts will include authors such as Marco Polo, Brunetto Latini, Marie de France, Clemence of Barking, Arnaut Daniel, the *Song of Roland* and the *Song of the Albigensian Crusade*. Readings and discussion in French.

FREN 3350 Romance to Revolution: The French Novel before 1750-1850 # (LA-AS)

Spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisites: FREN 2210 or permission of instructor. M. C. Vallois.

In addition to considering formal questions relating to the development of the novel in French, this course examines problems such as the appearance of narrative and historical consciousness, the representation of woman, and the relation between literature and society. Texts include such major works as Tristan and Iseult, Perrault's *Contes*, Mme de LaFayette, Prevost, Rousseau, Diderot, Laclous, and Sade.

FREN 3365 Shipwrecks: Disaster, Deliverance, and Colonial Modernity (also SPAN 2360) (LA-AS)

Spring. 4 credits. G. Aching.
For description, see SPAN 2360.

FREN 3370 The Québécois Experience (CA-AS)

Spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisites: FREN 2210, 3010, or 3050, or CASE Q++ placement. L. Dubreuil.

This course will present some of the major features of Québécois society, culture, religion, politics, and literature, from the early times of "Nouvelle France" (16th-17th century) to contemporary Québec. We will explore topics such as: the role of Catholicism, political activism, isolation and migrations, (post) coloniality and identity, Montréal. This is a truly multidisciplinary class, based on various pieces (voyage descriptions, political texts and memoirs, poems, theater plays, novels, films, songs, etc.). We will study excerpts from historical documents (Samuel de Champlain, the Jesuit descriptions of Quebec), or authors such as Emile Nelligan, Gaston Miron, Anne Hébert, Robert LePage, Gilles Vigneault, etc.

FREN 3710 Reading/Screening Women's Stories in French and Francophone Cultures

Fall. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisites: FREN 2210, 3010, or 3050, or CASE Q++ placement. M. C. Vallois.

The class is an introduction to reading and interpreting women's stories as they are represented, written, at times erased before being recovered in French and Francophone history and cultures. The course will analyze several figures/icons/images from the Old Regime to our time. The goal of the course is to familiarize students with the analyses of different strategies and techniques of representation (esthetic, historical, scientific, autobiographical, and fictional). The corpus of works studied will include fictional and historical writing as well as paintings and films. Examples of such case studies could

include: Joan of Arc, Marguerite de Valois, Marie-Antoinette, Heroines of fairy tales, Camille Claudel, unknown women workers, or well-known contemporary women authors such as Marguerite Duras, Marjane Satrapi, or Maryse Condé.

FREN 3730 Religious Violence in French and Francophone Texts # (CA-AS)

Spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisites: FREN 2210, 3010 or 3050, or CASE placement, or permission of instructor. K. Long.

This course will examine the various forms religious violence takes on: war, massacre, pillage, and torture—and consider the symbolic meanings invested in these forms of violence in the context of the work of René Girard (*La Violence et le sacré*). We will raise the question of what makes this sort of violence so intractable, and what has fostered the continuity of religious conflict over such a long span of time. For example, the ceremonial or ritualistic nature of this violence seems to give it an internal justification that is not subject to laws concerning human rights. Then, we will examine how a range of authors throughout history represent this violence in critical fashion. A number of texts present the impossibility of representing extreme violence, raising the question of how events can be witnessed when the witnesses are dead or traumatized by them. How can such extreme violence be represented or explained without being justified or rationalized? We will examine how the presentation of violence as a spectacle raises the question of personal responsibility in the context of large-scale and ongoing violence, implicating also those who observe but who do not directly participate. We will also consider Maalouf's *Les Croisades vues par les arabes* (as well as his *Identités meurtrières*), Joinville's *La Vie de Saint Louis*, Théodore Agrippa d'Aubigné's *Les Tragiques*, Elie Wiesel's *La Nuit*, Gillo Pontecorvo's *La Bataille d'Algers*, Jean Genet's *Les Paravents*, Shoshana Felman and Dori Laub's *Testimony*, and Elaine Scarry's *The Body in Pain*.

FREN 3860 Perfume, Jewelry, Cigarettes in French Literature (LA-AS)

Fall. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisites: FREN 2210, 3010 or 3050, or CASE Q++ placement. R. Klein.

Artifacts like perfume, jewelry, and cigarettes are often the focus of literary attention in France, not only for Epicurean motives but because, being essentially frivolous, without any evident social utility, they resemble in that respect aesthetic objects of art itself. This course proposes to read a number of works in which perfume, jewelry, and cigarettes are featured prominently, where their charms and seductions are illustrated and mobilized in the interest of broader allegorical aims.

FREN 3890 Canonical States, Canonical Stages (LA-AS)

Fall. 4 credits. M. Greenberg.

This course will be a comparative reading of several 17th-century tragedies. The authors we will read will be Shakespeare, Lope de Vega, Calderon, Corneille, and Racine. The course will attempt to delimit the origins of the modern state in the exclusionary practices that 17th-century tragedy stages for both contemporary (to the plays) audiences and to 21st-century audiences. Our critical apparatus

will borrow from different theories of ideology and subjectivity, as they pertain to the theatrical experience.

FREN 4010 Politics and Perversion in French 17th-Century Literature (also FREN 6010) (LA-AS)

Spring. 4 credits. M. Greenberg.
This course will use the concept "perversion" in its sexual, political, and theological definitions to examine the tensions of 17th-century French literature and culture. We will begin with a discussion of the work and trial of Theophile de Viau—a trial that set the tone of government intervention in poetic creation for the entire century. We will then look at other "scandals" including the heated debates of several religious women (Jeanne des Anges, Marie de l'Incarnation, Mme Guyon) who were involved in several of the theological scandals (possession) of the century. We will also look at some of the writings of P. Bayle and other Protestant and Catholic dissident intellectuals whose writings veered away from orthodoxy. Works by La Fontaine and his relation with N. Fouquet will be discussed in relation to the establishment of Louis XIV's version of absolutism in the arts. Finally we will look at a tragedy or two by both Corneille and Racine where sexual passion is shown to pervert familial structures necessary—or thought so—for a well one.

FREN 4150 Negrismo and Negritude: Africanist Poetics and Politics (also FREN 6150, SPAN 4150/6150) @ (LA-AS)

Fall. 4 credits. Open to students with very good reading knowledge of both Spanish and French. G. Aching.
For description, see SPAN 4150.

FREN 4190-4200 Special Topics in French Literature

4190, fall; 4200, spring. 2-4 credits each semester. Prerequisite: permission of instructor. Staff.

Guided independent study of special topics.

FREN 4240 Freud: An Introduction to Psychoanalysis (also FREN 6240)

Fall. 4 credits. M. Greenberg.
The class is intended to be an introduction for beginning graduate students to the history and theory of psychoanalysis. We will be primarily interested in reading the early texts of psychoanalysis, especially Freud, while indicating the different directions analytic theory and practice will take in their later developments.

FREN 4290-4300 Honors Work in French

4290, fall; 4300, spring (yearlong). 8 credits. R grade given at end of fall semester and final grade at end of spring semester. Open to juniors and seniors. Consult director of honors program for more information. Staff.

FREN 4310 French Theater: Staged Reading (LA-AS)

Fall. 4 credits. Conducted in French. L. Dubreuil.

This class gives students the opportunity to analyze literature, to practice theater, and to study French language at the same time. The final product of this course will be a public staged reading of a play in French (this play being conjointly determined by the students and the instructor). A staged reading involves performers reading aloud a text that they know well but they do not need to memorize, with only minimal movements, costumes,

prop, or lights. Throughout the semester, we will work on literary interpretation as well as on the practice of reading (voice, expression). Texts from the 17th to the 21st century might be studied. Though a previous experience in acting would be nice, it is by no means required to attend the class.

FREN 4350 Postcolonial Poetry and the Poetics of Relation (also COML 4290/6350, FREN 6350, SPAN 4350/6350) (LA-AS)

Fall. 4 credits. J. Monroe.
For description, see COML 4290.

FREN 4390 Poems of Force: Medieval Epic (LA-AS)

Spring. 4 credits. C. Howie.
This seminar is dedicated to the glittery, gory battle poems of the French Middle Ages, with special emphasis on the role of violence in the construction of national, narrative, and erotic identities. We'll take a look at two famous war poems, the *Song of Roland* and *Raoul de Cambrai*, as well as the romance afterlife of Virgil's *Aeneid* in the 12th-century *Roman d'Eneas*; time permitting, we'll also turn to Renaissance appropriations of medieval epic (and romance) tropes, particularly Tasso's *Gerusalemme liberata*. In addition to close readings of these texts, we'll turn to modern and contemporary thinkers such as Simone Weil, Anne Carson, Elaine Scarry, and others who have dealt delicately with the ethics and aesthetics of violence. Readings primarily in French, discussion in English. No previous experience with Old French required.

FREN 4520 Creativity and Constraints (also COML 4675)

Spring. 4 credits. T. McNulty.
Against our tendency to identify invention and discovery with an unbounded horizon—the open expanse of an uncharted territory, the limitless products of the imagination, or the unmarked potential of the blank page—this course will consider the role of boundaries, limits, obstructions, and constraints in shaping the creative process. Our discussions will draw upon a wide range of sources, from medieval lyric to contemporary architecture, from site-specific artworks to games and game theory, from the role of constraints in Sigmund Freud's conception of the psychoanalytic transference to Gaston Bachelard's and Henri Lefebvre's meditations on space, from literary mappings of civic space to Martin Heidegger's articulation of building, dwelling, and thinking. More specifically, we will focus on 20th-century collectives and movements whose members have sought in self-imposed limits or constraints both a renewal of the creative process and a means of transforming the social, political, and urban spaces in which they live: Surrealism and Dada, the French literary collective *Oulipo*, the Situationists, and the Danish film collective *DOGMA*, among others. Students will have the opportunity to conceive and execute artistic, social or political projects inspired by course readings in addition to writing formal papers.

FREN 4740 Romantic Novel (LA-AS)

Fall. 4 credits. R. Klein.
French Romanticism finds its most compelling expression in novels of disappointed love. This course will read a selection of those novels by Chateaubriand, Benjamin Constant, Nerval, Balzac, Stendhal, and Flaubert. Romantic love will be considered in relation to courtly love as it was formulated in Europe

in the 12th and 13th century, preserved and transformed by the Petrarchian tradition.

FREN 4824 Medieval Translation in Motion (also ENGL 4072, SHUM 4824)

Fall. 4 credits. S. Chaganti.
For description, see SHUM 4824.

FREN 4935 Subjectivation as Mode of Psychoanalysis—Zola's Department Store (also SHUM 4935)

Spring. 4 credits. S. Tsai.
For description, see SHUM 4935.

FREN 4936 Link, Network, Nexus (also COML 4115, GOVT 4748, SHUM 4936, STS 4361)

Spring. 4 credits. B. Massumi.
For description, see SHUM 4936.

FREN 6010 Politics and Perversion in French 17th-Century Literature (also FREN 4150)

Spring. 4 credits. M. Greenberg.
For description, see FREN 4010.

FREN 6150 Negrismo and Negritude: Africanist Poetics and Politics (also FREN 4150, SPAN 4150/6150)

Fall. 4 credits. Open to students with very good reading knowledge of both Spanish and French. G. Aching.
For description, see FREN 4150.

FREN 6240 Freud: An Introduction to Psychoanalysis

Fall. 4 credits. M. Greenberg.
For description, see FREN 4240.

FREN 6300 French Reading for Graduates

Spring. 3 credits. Prerequisite: graduate standing. T. Alkire.

Designed for those with little or no background in French. Aims primarily to develop skill in reading French. Covers grammar basics, extensive vocabulary, and strategies for reading in a foreign language. Some flexibility in selecting texts according to fields of interest.

FREN 6390–6400 Special Topics in French Literature

6390, fall; 6400, spring. 2–4 credits each semester. Staff.
Guided independent study for graduate students.

FREN 6470 The Theatricality of Gender, Philosophy, and French Literature (also FGSS 6470)

Fall. 4 credits. M. C. Vallois.
Selecting specific case studies from the time of Descartes and Marie de Gournay to Derrida and Butler, the seminar will examine the relationship between philosophical discourse and the theatricality of sexuality and gender in literary, juridical, scientific and other historical French and Francophone texts. The period of the Long Enlightenment (17th–18th centuries), which witnessed the questioning of Cartesian philosophy by the materialist philosophers will be central to the seminar. The goal of this inquiry is, however, to reframe the problematics of sexual differentiation as historical representation and production of “experience.” The preceding and succeeding moments of intellectual inquiries (the libertine age as well as the age of the social sciences) will bring new light to the nature/culture and universal/particular debate. It will do so also through the reading of these texts by contemporary theorists of our modernity such

as Merleau-Ponty, Foucault, Irigaray, Derrida, Spivak, Butler, and David-Menard. Some of the primary texts studied could include the works of Marguerite de Valois, Madame de Lambert, Montesquieu, Diderot, Germaine de Staël, George Sand, Simone de Beauvoir and Hélène Cixous, Maryse Condé.

FREN 6480 The Refusal of Politics

Spring. 4 credits. L. Dubreuil.
Graduate seminar on the *negative* relations between literature and politics. It will include a reading of some theories of *engagement* and *dégagement* (or *retrait*) from the last decades. We will compare these theories with the discrete and problematic solutions that literary oeuvres have invented. We shall focus on the literary refusal of society in 19th-century France and will consider different ways of living in an “ivory tower.” Authors to be studied could include Mme. de Staël, Vigny, Hugo, Baudelaire, Flaubert, Maupassant, Mallarmé, or Zola.

FREN 6650 Queer Theory (also FGSS/ITAL 6650)

Spring. 4 credits. C. Howie.
This course explores queer fiction in the widest possible sense. We'll take a look at the complicated relationship between narrative and sexuality in modern French and Italian literature, with occasional detours into the Anglophone world. In the process, we'll pay special attention to canonical figures of modern homosexuality (e.g., Colette, Gide, Genet, Yourcenar, and Pasolini) and to writers less comfortably, which is to say more queerly, positioned within that cannon (e.g., Kathy Acker, David Wojnarowicz, Pat Califia, Hervé Guibert, Pier Vittorio Tondelli). Readings and discussion in English.

Italian

T. Alkire, M. Baraldi, K. Bättig von Wittelsbach, T. Campbell, F. Cervesi, M. Migiel, K. Serafin, R. Welch (visiting). Emerita: A. Grossvogel.

The Major

The Italian section offers a major in Italian with tracks in Italian literature and culture and Italian studies. The first track is designed for students who wish to study Italian language, literature, and culture through the works of writers, artists, and cultural figures who have developed rich and varied aesthetic traditions. The second track in Italian studies includes a broader progression of courses that entails work in related disciplines. Both are designed to provide students with proficiency in reading, speaking, and writing in Italian, to familiarize them with Italian culture, and to assist them in analyzing Italian texts in related fields. For further information, students are asked to consult the director of undergraduate studies.

Track 1: Italian Literature and Culture

Track 1 is designed for students who: (1) wish to study Italian language, literature, and culture through the works of writers, artists, and cultural figures; and (2) wish to do most of their course work in Italian.

Admission: the prerequisite for official admission to Track 1 of the Italian major is successful completion of any ITAL course at the 2000 level or higher conducted in Italian.

Students who wish to follow Track 1 in Italian are advised to consult with the director of undergraduate studies (DUS). The DUS will take into account the student's interest, preparation, and career goals and assign the student to an advisor. Students majoring in Italian are expected to become conversant with a fair portion of the masterworks of Italian literature, to acquaint themselves with the outlines of Italian literary and cultural history, and to develop some skill in textual and cultural analysis. In conjunction with the major advisor, the student will craft an individualized plan of studies that will meet the minimum requirements for Track 1 as listed here:

- At least 10 Italian literature or culture courses at the 2000 level and higher (the prerequisite may be counted toward this requirement. The 1-credit Italian practicum and the 1- or 2-credit independent study options do not count as full courses). One of these courses must be at the 4000 level and one must focus on Italian texts before the 19th century. With the permission of the advisor, the student may substitute for two of these courses other courses that are deemed relevant to the student's study of Italian, e.g., a course in another national literature, a course in critical theory, or a course in European history.
- At least 20 credits in courses conducted entirely in Italian. The Italian practica may be used to fulfill 3 of these credits. Twelve of these credits must be in courses in Italian at the 3000 level or above.
- Competency in the Italian language (as demonstrated by examination or by course work approved by the DUS).

ITAL 4040 History of the Italian Language and ITAL 4030 Linguistics Structure of Italian may be counted toward the 10 courses required for the major. Note: An introductory course is prerequisite for ITAL 4030 and 4040.

Track 2: Italian Studies

Track 2 in Italian Studies is designed primarily for students who wish to pursue individual interests that do not fall within Track 1 of a major. Students select courses from Italian as well as courses from other departments that have a substantial Italian component, such as History of Art, Architecture, Government, Music, and Comparative Literature. For the list of approved Italian studies courses, please see the director of undergraduate studies.

Admission: By the end of their sophomore year, prospective majors in Track 2 should have taken ITAL 2190 Intermediate Conversation and Composition or demonstrated the equivalent level of fluency.

To complete the program, students must:

1. Demonstrate competence in the Italian language by completing ITAL 3130 Advanced Conversation and Composition, or its equivalent (such as ITAL 3300 Italian Writing Workshop);
2. Complete the core series of Italian Studies courses: ITAL 2900 Perspectives in Italian Culture (fall), ITAL 2950 Italian Cinema (fall), and ITAL 2970 Introduction to Italian Literature (spring);
3. Complete at least five courses (20 credits) from the approved list of Italian Studies

courses at the 3000 level or above from no more than three departments. Students planning on studying abroad for a year or a semester in Italy should plan their course work to emphasize their individual interests. Note: Students must maintain a B- in each of the five Italian Studies courses; and

4. Select a committee of one or more faculty advisors to help formulate a coherent program of study. One of the advisors must come from the Italian section.

Students are encouraged to enrich the program by combining this option with other majors in related fields such as history of art, music, comparative literature, or architecture.

Minor in Italian Studies

In order to complete an undergraduate minor in Italian Studies, students must take at least five courses (a minimum of 15 credits) by selecting courses in consultation with the minor advisor, one of which must be ITAL 2900 Perspectives in Italian Culture. These courses must be allocated among at least three Cornell departments and must include one introductory course and one course at the advanced level. Language competence must be demonstrated by successfully completing ITAL 2190. Please note that courses taken as part of a study abroad program approved by the Study Abroad Dean may count toward meeting the above requirements.

Students wishing to enroll in the minor must register their intent by contacting the director of undergraduate studies, who will assign a faculty advisor to students.

Study Abroad in Italy: Italian studies faculty members strongly encourage students to consider studying abroad in Italy. Students will have the opportunity to immerse themselves in Italian and gain a singular perspective on the Italian cultural context.

Students are urged to consider the Bologna Cooperative Studies Program (BCSP), of which Cornell is an associated member. BCSP offers qualified undergraduate students an opportunity to study for a full academic year or a semester at the University of Bologna for credit. During each semester of the academic year, which begins in October and extends through June, BCSP students enroll in one or two regular University of Bologna courses with Italian students. Students may also take special courses in Italian literature, language, art history, film studies, and contemporary politics.

Enrollment in a language course is conditional upon the student's eligibility for the particular level and on attendance at the first scheduled class session. Because of the high demand for language courses, a student who fails to attend the first class meeting will be dropped so others may register.

Note: Students placed in the 2000-level course have the option of taking language and/or literature courses.

ITAL 1210-1220 Elementary Italian

1210, fall; 1220, spring. 4 credits each semester. Prerequisite: for ITAL 1220, 1210 or LPI 37-44 or SAT II 370-450. Intended for beginners or students placed by examination. At the end of ITAL 1220, students who score lower than 56 on the LPI take ITAL 1230; those with 56 or higher may enter the 2000-level sequence. M. Baraldi, K. Serafin and staff.

This introductory course provides a thorough grounding in all the language skills: listening, speaking, reading, and writing, with practice in small groups. Lectures cover grammar and culture.

ITAL 1230 Continuing Italian

Fall or spring. 4 credits. Prerequisite: ITAL 1220, or LPI 45-55 or SAT II 460-580. K. Bättig von Wittelsbach.

This is an all-skills course designed to improve speaking and reading ability, establish a groundwork for correct writing, and provide a substantial review of grammar.

ITAL 2090 Italian Intermediate Composition and Conversation I

Fall or spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: ITAL 1230, or LPI 56-64, or SAT II 590-680, or CASE Q. F. Cervesi.

This course provides a review of composition, reading, pronunciation, and grammar as well as guided practice in conversation. It emphasizes the development of accurate and idiomatic expression in the language.

ITAL 2140 World News, Italian Views (CA-AS)

Spring. 4 credits. *Satisfies Option 1 of language requirement.* Limited to 18 students. Prerequisite: ITAL 2090 or permission of instructor. Designed to improve students' proficiency in Italian. Special attention will be given to writing. Conducted in Italian. M. Migjel.

In this seminar, we will read, discuss, and write about a variety of global and transnational issues that get debated in the Italian media. Our approach to these cultural issues will be grounded in rhetorical and discourse analysis. Students will be required to analyze information from Italian and English (both U.S. and British) sources. Students who read other languages (e.g., French, Spanish) will be encouraged to offer points of comparison. Topics will take into account student interests and are likely to include current events; international politics; developments in science and technology; economic and business ventures; cultural events; sports.

ITAL 2190 Italian Intermediate Composition and Conversation II

Spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: ITAL 2090 or equivalent. K. Bättig von Wittelsbach.

Guided conversation, composition, reading, pronunciation, and grammar review emphasize the development of accurate and idiomatic expression in the language.

ITAL 2900 Perspectives in Italian Culture (CA-AS)

Fall. 3 credits. "Core course" in track two of the Italian major, offered every year. Conducted in English with discussion section in Italian. R. Welch.

This course aims to provide students with the tools necessary to understand the most important social, political, and artistic developments occurring in contemporary Italian culture. These include the nature of geographic and national fragmentation in post-Risorgimento "ITALY"; The "Southern" question and the phenomenon of "Costa Nostra"; Italian contributions to world cinema; and the politics of food. By providing students with interdisciplinary perspectives on Italian culture, they will be introduced to how Italian culture is produced and consumed globally

today. Primary readings include selections from Peter Robb, Leonardo Sciascia, and Tim Parks, and films from Rossellini, de Sica, Sergio Leone, and Benigni. A group of secondary readings stimulates the discussion of the historical and cultural panorama of contemporary Italy.

ITAL 2950 The Cinematic Eye of Italy (CA-AS)

Fall. 3 credits. *Satisfies Option 1 of language requirement.* Prerequisite: ITAL 2090 or permission of instructor. E. Fay.

Introduces students to Italian cinema from the 1940s to today. Students will view the representative works of the most important Italian directors in order to create a perspective on one of the world's major national cinematic traditions. We will pay close attention to the sociopolitical context of the films as well as considering the technical and formal issues that arise when studying Italian cinema. Emphasis will be given to Italian neo-realism, Italian political cinema of the 1970s, and contemporary Italian films.

ITAL 2970 Introduction to Italian Literature (LA-AS)

Spring. 3 credits. *Satisfies Option 1 of language requirement.* "Core course" in Italian Studies major. Prerequisite: ITAL 2090 or permission of instructor. Conducted in Italian. L. Fabbri.

The course aims to introduce students to Italian literature, mainly through readings in prose and poetry from the 20th century. The course includes significant practice in grammar, vocabulary building, and composition, and to this end, students are required to write five papers of medium length over the course of the semester.

ITAL 3020 Italian Practicum

Spring. 1 credit. Staff.

Students enrolled in an Italian literature or culture course that is conducted in English may opt to take this practicum provided that they have already attained proficiency in the language.

ITAL 3130 Advanced Italian: Language in Italian Culture (LA-AS)

Spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: ITAL 2190 or equivalent. Conducted in Italian. K. Bättig von Wittelsbach.

This course is designed to develop accuracy and fluency in oral and written expression, and to sharpen awareness of idiomatic and stylistic nuances in present-day Italian. The material discussed is drawn primarily from a wide range of social and cultural issues in modern Italy, and in the areas of Europe where Italian is an official (Switzerland) or a regional minority language (Istria). Some of the topics discussed are: the role of Italy in the European Community, the place of the minorities (especially that of more recent, non-European immigrants) in the Italian public life, the importance of art and artist in the contemporary Italian society, and the changing Italian language and its regional varieties. Listening and speaking skills are cultivated through the frequent use of authentic audio and visual materials. Readings range from fictional to analytical and argumentative, with writing assignments frequently emulating the text being read. Presentations and grammar review are also an important component of this course.

ITAL 3400 History of the Grotesque (LA-AS)

Fall. 3 credits. *Satisfies Option 1 of language requirement.* Prerequisite: ITAL 2090 or permission of instructor.

Italian literary history, seen from a certain angle, is a series of moments of rhetorical exaggeration, bodily deformity, sexual overkill, religious satire, and extreme violence: hallmarks of an aesthetic category that came, at some point in the modern period, to be called the grotesque. We'll examine the particular shapes to which this category can be applied across time, and which may in turn alter the very shape of the category. After all, the grotesque is nothing if not a question of shapes: of anticipated literary and bodily forms, and their eventual disappointment or monstrous transformation; of how aesthetic devices not only represent but produce the "normal" body as an effect of its many variations. Expect blasphemous monkeys, farting devils, and lots of intimidating women.

ITAL 3890 Modern Italian Novel (also ITAL 6890) (LA-AS)

Spring. 4 credits. R. Welch.

Topic for Spring 2010: Narrating the City: The Case of Rome. In this course, we will examine a fervently articulated and debated social object—the city—and its uses in modern Italian narrative. We will situate our inquiry on the intersections of urban and narrative space in the "eternal city" of Rome—the locus of governmental and ecclesiastical power in modern Italy, and the inspiration for and site of countless imaginative renderings in art, literature, film, and television. This course is concerned in particular with the space of Rome from the late 19th to the 20th century, and our readings will include novels, films, and short stories that represent Rome as a site of working-class struggle, bourgeois rationality, aristocratic decadence, fascist power and resistance, racial and sexual marginality, and/or affective (trans)formation. Our readings will address the following questions: if clearly defined boundaries delineate the city as a political space, what limits are at work in defining it within a narrative space? What kinds of inclusions, and exclusions shape a given urban space? What relationships—geographic, architectural, but also rhetorical and narrative—are forged between the city and its periphery? Primary readings to include novels and films by Matilde Serao, Gabriele D'Annunzio, Alberto Moravia, Natalia Ginzburg, Roberto Rossellini, and Pier Paolo Pasolini. Secondary readings to include essays by: Louis Althusser, Roland Barthes, Walter Benjamin, Marshall Berman, Giuliana Bruno, Michel De Certeau, and Michel Foucault.

ITAL 4190-4200 Special Topics in Italian Literature

4190, fall; 4200, spring. 2-4 credits each semester. Prerequisite: permission of instructor. Staff.

Guided independent study of special topics.

ITAL 4270 Dante's Commedia (also ITAL 6270) # (LA-AS)

Spring. 4 credits. M. Migiel.

In this seminar, dedicated to a close reading of Dante's *Commedia* (1321), we will consider how Dante's poem explores such issues as: the search for language adequate to convey experience surpassing human comprehension: the creation of a narrating "I"; the education of the reader; the relation between truth and enterprise; the redemptive potential of art (and

its ability to deceive as well as to enlighten and console); the call to bear witness, both to life and to loss. Particular attention will be dedicated to teaching students how to read in interpret medieval Italian texts. Graduate students are required to attend an extra session each week (time TBA), dedicated to discussion of critical methodology and the secondary literature on Dante.

ITAL 4290-4300 Honors Work in Italian

4290, fall; 4300, spring (yearlong). 8 credits. R grade given at end of fall semester and final grade at end of spring semester. Open to junior and seniors. Consult director of honors program for more information. Staff.

ITAL 4822 Life As We Know It: Readings in the Biopolitical Paradigm (also COML 4965, SHUM 4822)

Fall. 4 credits. T. Campbell.

For description, see SHUM 4822.

ITAL 6270 Dante's Commedia (also ITAL 4270)

Spring. 4 credits. M. Migiel.

For description, see ITAL 4270.

ITAL 6390-6400 Special Topics in Italian Literature

6390, fall; 6400, spring. 2-4 credits each semester. Staff.

Guided independent study for graduate students.

ITAL 6640 Queer Theory (also FGSS/FREN 6650)

Spring. 4 credits. C. Howie.

For description see, FREN 6650.

Portuguese

Faculty: L. Horne, J. Oliveira.

PORT 1210-1220 Elementary Brazilian Portuguese I-II

1210, fall; 1220, spring. 4 credits each semester. PORT 1210 is the prerequisite for PORT 1220. J. Oliveira.

This is a full-year introductory course, intended for students with no knowledge of Portuguese, and with limited or no knowledge of Spanish. Stress is placed upon the development of the fundamental communication skills: listening, speaking, reading, and writing.

PORT 2090-2190 Intermediate Brazilian Portuguese for Spanish Speakers I-II @

2090, fall; 2190, spring. 4 credits each semester. *PORT 2090 satisfies Option 1 of language requirement.* Prerequisite: for 2090, PORT 1220; for 2190, PORT 2090 or permission of instructor. J. Oliveira.

PORT 2090-2190 is a full-year course intended for students who have already taken the first level of Portuguese, or as an intensive introductory course for those who are native/near native speakers of Spanish. An all-skills course with particular emphasis on Brazilian Portuguese spoken within the context of its culture, it presents a fast-paced review focused on improving grammatical accuracy, pronunciation and on enriching vocabulary.

PORT 3200 Readings in Modern Brazilian Literature (LA-AS)

Spring. 4 credits. L. Horne.

This course aims to provide an overview of modern Brazilian literature. It will cover the

major literary movements and the essential canonical writers of 19th- and 20th-century Brazil. Some of the topics to be discussed are: the formation of the national literature; literature and slavery; foreign models and rewritings; diverse definitions of national spaces and landscapes; relationships between aesthetic innovations and political issues and different literary definitions of frontiers, margins, and exclusions. The course also intends to introduce students to the practice of literary analysis, and to provide an opportunity to improve language skills in Portuguese through extensive oral and written practice. Some of the authors to be read include Aluzio Azevedo, J. M. Machado de Assis, Mário de Andrade, Oswald de Andrade, Clarice Lispector, Graciliano Ramos, João Guimarães Rosa, Nelson Rodrigues and Aba Cristina César.

PORT 4200 Special Topics in Brazilian Literature

Spring. 2-4 credits. Prerequisite: permission of instructor.

Guided independent study of specific topics. For undergraduates interested in special problems not covered in courses.

PORT 4720 Between Fact and Fiction: The Documentary Tradition in Latin American Literature, Film, and Visual Arts (also SPAN 4720) @ (CA-AS)

Spring. 4 credits. L. Horne.

This course explores how the concept of "document" becomes articulated in multiple cultural practices in contemporary Latin America. Through a selection of texts, films, photographic installations and other works we will study how the documentary genre permeates different cultural manifestations, acting as a crossing point between different artistic media. We will explore how the presence of the document blurs the boundary not only between fact and fiction, but also between subject and object, and ultimately between the different arts. The course provides a historical survey of the "documentary tradition" throughout the 20th century seeking to understand the specificities of the contemporary moment. Both classic and recent theoretical texts on the subject will be covered.

PORT 6400 Special Topics—Grad

Spring. 2-4 credits. L. Horne.

Guided independent study of specific topics.

Romance Studies

Faculty: D. Cruz de Jesús.

ROMS 5070 Methodology of Romance Language Learning and Teaching

Spring. 3 credits. Required for all graduate TAs who will be teaching Romance languages for the first time at Cornell. D. Cruz de Jesús.

Focuses on language teaching as facilitation of learning, thus on the learner's processing of language acquisition and the promotion of reflective teaching. Pedagogical approaches will be addressed from a learner-centered perspective involving effective language learning strategies and analysis.

ROMS 5080 Pedagogy Practicum

Fall. 1 credit. Required for all graduate TAs teaching language for the first time in the Department of Romance Studies. Staff. This practicum is designed to better enable the TAs to meet the needs of their students in the understanding and acquisition of the

linguistic forms, notions and functions covered in their course.

Spanish

G. Aching, S. Amigo-Silvestre, M. Balsa, M. Beviá, T. Beviá, B. Bosteels, D. Castillo, D. Cruz de Jesús, M. A. Garcés, J. Rodríguez-García, L. Horne, P. Keller, C. Lawless, N. Maldonado-Méndez, J. E. Paz-Soldán, S. Pinet, M. K. Redmond, J. Routier-Pucci, A. Stratakos-Tió, B. Teutli. Emeritus: C. Morón Arroyo.

The Major

The Spanish major is designed to give students proficiency in the oral and written language, to acquaint them with Hispanic culture, and to develop their skill in literary and linguistic analysis. Satisfactory completion of the major should enable students to meet language and literature requirements for teaching, to continue with graduate work in Spanish or other appropriate disciplines, and to satisfy standards for acceptance into the training programs of the government, social agencies, and business concerns. A Spanish major combined with another discipline may also allow a student to undertake preprofessional training for graduate study in law or medicine. Students interested in the major are encouraged to seek faculty advice as early as possible. For acceptance into the major, students should consult the director of undergraduate studies, who will admit them to the major, and assign them an advisor from the Spanish faculty. Spanish majors will then work out a plan of study in consultation with their advisors. Spanish majors have great flexibility in designing their programs of study and areas of concentration. Previous training and interests as well as vocational goals will be taken into account when the student's program of course is determined.

SPAN 2190 is a prerequisite to entering the major in Spanish.

All majors will normally include the following core courses in their programs:

1. SPAN 2150, 2150, and 2170 (not necessarily in that order).
2. SPAN 3100 and 3110.
3. One of the two senior seminars offered each year. A minimum grade of B- is required in order for a course to count toward the major.

The Spanish Literature Option

The Spanish literature option normally includes at least 15 credits of Spanish literature beyond the core courses. Literature majors are strongly urged to include in their programs all the major periods of Hispanic literature.

Area Studies Option (Spanish, Latin American, or U.S. Latino Studies):

At least 15 credits of courses at the 3000 level and above in any of those focus areas beyond the core, all courses to be approved through consultation with the major advisor. Courses should reflect interdisciplinary interests in the area and may include up to three other academic fields of interest. For example, a student interested in Latin American studies may want to include courses on such topics as Latin American history, government, rural sociology, and economics. Students who want

to specialize in U.S. Latino issues may want to include such topics as sociology of Latinos, Latino history, and Latino medical issues in addition to further studies in literature. Students specializing in Spanish studies planning on spending a year or semester in Spain (but not exclusively such students) frequently plan their course work to emphasize Spanish history, art, political economy, and other related field courses, such as courses on Islam and Moorish or Jewish Spain.

Students are encouraged to enrich the major program by including a variety of courses from related fields or by combining Spanish with related fields such as history, philosophy, sociology, anthropology, art, music, classics, English, comparative literature, and other foreign languages and literatures. The interdepartmental programs in Latin American studies and Latino studies sponsor relevant courses in a variety of areas.

The J. G. White Prize and Scholarships are available annually to undergraduate students who achieve excellence in Spanish.

Minor in Spanish

The minor promotes a broad understanding of Spanish and Spanish American culture, literature, and society; it also encourages students to refine and practice their language skills. In order to complete the minor, students must take a minimum of 5 courses (15 credits), distributed as follows: Language competence must be demonstrated by successfully completing either SPAN 3100 (Advanced Spanish Conversation and Pronunciation) or SPAN 3110 (Advanced Spanish Writing Workshop). Students pursuing a minor must furthermore complete either SPAN 2200 (Perspectives on Latin America) or SPAN 2230 (Perspectives on Spain), as well as three elective courses to be chosen in consultation with the student's advisor. Among those electives, students are strongly encouraged to take at least one course at the advanced 3000-4000 level.

Students wishing to enroll in the minor must register their intent by contacting the minor advisor, who will assign a faculty advisor to each student.

Study Abroad in Spain: Cornell, the University of Michigan, and the University of Pennsylvania co-sponsor an academic year in Spain program. Students enrolled in this program spend the first month before the fall semester begins in an orientation session at the University of Seville, where they take courses in Spanish language and culture and take advantage of special lectures and field trips in Andalusia. Once the semester begins, students enroll in regular classes at the University of Seville and at the program's center facility. Center courses are designed for the program and include a seminar offered by the resident director, from the faculty of either Cornell, Michigan, or Pennsylvania. Other center courses typically include history of art, history of the Mediterranean region, a literature course, and Spanish composition and syntax. In Seville, students live in private homes and a rich array of cultural activities and excursions are organized every semester.

Applicants are expected to have completed SPAN 2190 before departure. Completion of SPAN 3110 is highly recommended. Students are strongly encouraged to study abroad for

the entire year rather than one semester. Students interested in the study abroad program should visit Cornell Abroad in 474 Uris Hall and see the Cornell Abroad web site: www.einaudi.cornell.edu/cuabroad.

Study Abroad in Bolivia: The summer program in Cochabamba, Bolivia, is sponsored by the Latin American Studies Program and accepts both undergraduate and graduate students. Students live with Bolivian families and normally take two courses with Cornell faculty who participate in this program. In addition to course work in Bolivian culture, politics, and social movements, the program features the opportunity to do intensive study in Quechua, the native language spoken by many Bolivians, and Peruvians, as well as Spanish, and to participate in research and internships with grass-roots communities, government offices, and businesses.

New Summer program in Nicaragua: Cornell is partnering with the Centro de Idiomas in Ocotal, Nicaragua to offer an exciting new experiential learning opportunity. The program combines Spanish language instruction (from beginning Spanish to more advanced conversational Spanish) and internships (choose from opportunities in agriculture, education, health or engineering). Participants also earn 3 Cornell credits (LATA 4970 or IARD 4970: Independent Study).

Honors: Honors in Spanish may be achieved by superior students who want to undertake guided independent reading and research in an area of their choice. Students in the senior year select a member of the Spanish faculty to supervise their work and direct the writing of their honors essay (see SPAN 4290–4300).

Courses in the Spanish Program

Enrollment in a language course is conditional upon the student's eligibility for the particular level and on attendance at the first scheduled class session. Because of the high demand for language courses, a student who fails to attend the first class meeting will be dropped so others may register.

Note: Students placed in the 2000-level course have the option of taking language and/or literature courses.

SPAN 1120 Elementary Spanish: Review and Continuation

Fall. 4 credits. *Students may not receive credit for both SPAN 1120 and 1220.* Prerequisites: LPS 37–44 or SAT II 370–450. Students who have taken SPAN 1210 may enroll. Meets five times a week: four class sessions and one lecture. M. Beviá.

Provides a basic review and then moves on to cover new material for the remainder of the semester. As part of the final exam, students take the LPS and, according to their score, may place into SPAN 1230 (score below 56) or into the 2000-level course (score 56 or above).

SPAN 1210 Elementary Spanish I

Fall. 4 credits. Prerequisite: students with no previous knowledge of Spanish or up to two years of high school Spanish. Meets five times a week: four class sessions and one lecture. M. K. Redmond and staff.

Using an integrated approach in small classes, this course develops listening, speaking, reading, and writing in a cultural context. Class sessions are conducted entirely in Spanish and the language is actively used in communicative, creative, and critical thinking

activities. Students read short cultural and literary texts to foster vocabulary acquisition and develop reading strategies. Students develop writing skills by writing and editing compositions on various subjects. Lectures introduce and clarify grammatical structures. Daily preparation and active participation are required. After this course, students may take SPAN 1220.

SPAN 1220 Elementary Spanish II

Spring. 4 credits. *Students may not receive credit for both SPAN 1120 and 1220.*

Prerequisite: SPAN 1210, or LPS 37–44, or SAT II 370–450. Class meets five times a week: four class sessions and one lecture. M. K. Redmond and staff.

Using an integrated approach in small classes, this course develops listening, speaking, reading, and writing in a cultural context. The course begins with a fast-paced review of SPAN 1210 and then introduces new material. Class sessions are conducted entirely in Spanish and the language is actively used in communicative, creative and critical thinking activities. Students read cultural and literary texts to foster vocabulary acquisition, complete analytical exercises, and develop reading strategies. Students continue developing writing skills by writing and editing compositions. Lectures introduce and clarify grammatical structures. Daily preparation and active participation are required. After 1220, students may take 1230, 2070, or 2090 depending on their LPS score, which is the final exam.

SPAN 1230 Continuing Spanish

Fall, spring, or summer. 4 credits. Prerequisite: SPAN 1220, or LPS 45–55, or SAT II 460–580. Meets four times a week. Fall and spring, S. Amigo-Silvestre and staff; summer: A. Stratakos-Ti6.

The goal of this low-intermediate course is to achieve a higher level of comprehension as well as to advance oral and written expression in a cultural context. Small classes are conducted entirely in Spanish and the language is actively used in communicative, creative, and critical thinking activities. Students engage in linguistic and literary analysis of texts to acquire new vocabulary, complete analytical exercises and develop reading strategies. Students continue developing writing skills by writing and editing compositions on various subjects and review grammatical structures on their own although the instructor may clarify as needed. Oral presentations, daily preparation and active participation are required. After this course, students may take SPAN 2000, 2070, or 2090.

SPAN 2070 Intermediate Spanish for the Medical and Health Professions

Fall or spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: SPAN 1230, LPS 56–64, or SAT II 590–680, Q on CASE exam. Students who have taken SPAN 2000 or 2090 should speak to instructor. A. Stratakos-Ti6.

Provides a conversational grammar review, with dialogues, debates, compositions, and authentic readings on health-related themes. Special attention is given to relevant cultural differences and how cultural notions may affect medical care and communication between doctor and patient. The objective of 2070 is to provide practice in real-life application, such as taking a medical history, calming a patient, and how to speak to a

Hispanic patient in a culturally acceptable manner. After this course, a student may take SPAN 2140, 2150, 2170, or 2190.

SPAN 2090 Intermediate Spanish I (Composition and Conversation)

Fall or spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: SPAN 1230, or LPS 56–64, or SAT II 590–680, or CASE Q. Not open to students who have taken SPAN 2070. Class meets three times a week. J. Routier-Pucci and staff.

This intermediate course develops accurate and idiomatic oral and written expression in a cultural context. Students achieve a higher level of syntactical and lexical competence through the study of stylistics, reading and discussing literary texts, and viewing films. Particular emphasis is on writing academic essays with editing and peer/instructor feedback. Small classes are conducted entirely in Spanish and the language is actively used in communicative, creative and critical thinking activities. Students are responsible for reviewing grammatical structures on their own. Oral presentations, daily preparation, and active participation are required. After this course, students make take SPAN 2140, 2150, 2170, or 2190.

SPAN 2140 The Spanish Difference: Readings in Modern Iberian Literatures (LA-AS)

Fall or spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: SPAN 2070 or 2090, or CASE Q+, or permission of instructor. Conducted in Spanish. Fall, M. Balsa and staff; spring, P. Keller and staff.

Introductory survey of modern Spanish literature. Students develop their analytical skills and learn basic literary concepts such as genre (drama, lyric, short story and novel) and style (romanticism, realism, etc.) as well as male/female perspectives and the translation of literature to film language. The survey introduces students to Spain's cultural complexity through readings of works by authors representative of its diverse linguistic and literary traditions.

SPAN 2150 The Tradition of Rupture: Latin American Writing from Modernism to the Present (also LATA 2150) @ (LA-AS)

Fall or spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: SPAN 2070 or 2090, or CASE Q+ or permission of instructor. Conducted in Spanish. Fall, B. Bosteels and staff; spring, J. M. Rodríguez-García and staff.

Readings and discussion of representative texts of the 19th and 20th centuries from various regions of Spanish America. Among the authors considered are Sarmiento, Hernández, Martí, Darío, Agustini, Cortázar, García Márquez, Poniatowska, and Valenzuela.

SPAN 2170 Early Hispanic Modernities: Readings in Medieval and Early Modern Iberian and Spanish-American Literatures (also LATA 2170) # (LA-AS)

Fall or spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisites: SPAN 2070 or 2090, or CASE Q+, or permission of instructor. Conducted in Spanish. Fall, M. A. Garcés; spring, S. Pinet.

This course explores major texts and themes of the Hispanic tradition from the 11th to the 17th centuries. We will examine general questions on literary analysis and the

relationship between literature and history around certain events, such as medieval multicultural Iberia, the creation of the Spanish Inquisition in the 15th century and the expulsion of the Jews in 1492; the encounter between the Old and the New Worlds; the "opposition" of high and low in popular culture, and of the secular and the sacred in poetry and prose. Issues of representation regarding gender, identities, and subjectivity may also be studied. Readings may be drawn from medieval short stories and miracle collections; chivalric romances, Columbus, and the literary as well as geographic discovery, Lazarillo de Tormes, Cervantes, Lope de Vega, Calderón, and Sor Juana Inés de la Cruz, among others.

SPAN 2190 Intermediate Spanish II (Composition and Conversation)

Fall or spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: SPAN 2070, or SPAN 2090, or CASE Q+. Class meets three times a week. T. Beviá and staff.

This advanced-intermediate course is designed to prepare students for study abroad and entry into the major. It prepares students for advanced level courses, in a native-speaker context. Students study stylistics, analyze, and discuss texts, view films, and acquire advanced reading strategies. Continued emphasis is on writing academic essays with editing and peer/instructor feedback. Small classes are conducted entirely in Spanish and the language is actively used in communicative, creative, and critical thinking activities. Students are responsible for reviewing grammar structures on their own and take greater command of their own language learning process. Oral presentations, daily preparation, and active participation are required. SPAN 2190 may be taken concurrently with SPAN 2140, 2150, or 2170.

SPAN 2200 Perspectives on Latin America (also LATA 2200) @ (CA-AS)

Spring. 3 credits. Highly recommended for Latin American studies concentrators. Conducted in English. 1-credit disc sec conducted in Spanish. B. Bosteels and C. Lawless.

Interdisciplinary, co-taught course offered every spring. Topics vary by semester, but readings always focus on current research in various disciplines and regions of Latin America. The range of issues addressed include the economic, social, cultural, and political trends and transitions in the area. In the weekly meetings, instructors and guest lecturers facilitate student discussions. Students taking the course are required to participate in all class discussions and write a research paper in their chosen focus area.

SPAN 2230 Perspectives on Spain (LA-AS)

Fall. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: SPAN 2190 or permission of instructor. Conducted in Spanish. P. Keller.

An introduction to Spain's history, plural cultures, and present-day society. Through a series of key literary works, films, and other visual representations we will explore such topics as the place of tradition, religion, and the family in modern Spain. Our focus will be on the transformation of Spain from an authoritarian state under General Franco's dictatorship (1939-1975) into a remarkably diverse and pluralistic nation in which linguistic, cultural, political, and gender

differences have been consecrated in a very progressive legislation. This course satisfies the main requirement for the minor in Spanish, may be used as an elective for the major, and is crucial to those planning to study abroad in Spain in the near future.

SPAN 2340 Faith, Love, and Adventure in Medieval Spain # (LA-AS)

Fall. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisites: SPAN 2190, CASE Q++, or permission of instructor. S. Pinet.

Examines a wide variety of cultural objects and practices of Medieval Spain—from art objects to religious practices, from poetry to music—to address questions of identity, faith, institutions, historicity, and nation-building in multicultural Iberia. Students are expected to participate actively in class discussion and to prepare written critical analyses. Primary sources constitute the main corpus, but modern perspectives on the Spain of the Middle Ages are also included.

SPAN 2360 Shipwrecks: Disaster, Deliverance, and Colonial Modernity (also FREN 3365) (LA-AS)

Spring. 4 credits. G. Aching.

This course examines actual and imagined shipwrecks as the means by which witnesses, survivors, writers, and artists reflect on the relation between disaster and deliverance; civilization and barbarism, and necessity, freedom, and contingency, and the role of capitalism in these relations. The course begins with classical readings on shipwrecks and castaways, such as selections from Homer's *Odyssey*, the shipwreck of St. Paul, and Horace's shipwrecked sailor. Subsequent readings focus principally on shipwrecks within colonial frameworks, such as Alvar Núñez Cabeza de Vaca's *Castaways*, Luis de Góngora's *Solitudes*, Daniel Defoe's *Robinson Crusoe*, Jen-Baptiste Savigny's and Alexandre Corréard's *Narrative of a Voyage to Senegal in 1816*, as well as on Herman Melville's *Moby Dick*. Critical readings include selections from Marx's *Capital* and C. L. R. James's *Mariners, Renegades, and Castaways*.

SPAN 3010 Hispanic Theatre Production (also LATA 3010)

Fall. 1-3 credits, variable. *3 credits satisfies Option 1 of language requirement and fulfills (LA-AS).* D. Castillo.

Students develop a specific dramatic text for full-scale production. The course involves selection of an appropriate text close analysis of the literary aspects of the play, and group evaluation of its representational value and effectiveness. All students in the course are involved in some aspects of production of the play, and write a final paper as a course requirement. Credit is variable depending upon the student's role in play production: a minimum of 50 hours of work is required for 1 credit; a maximum of 3 credits are awarded for 100 hours or more of work.

SPAN 3020 Spanish in the Disciplines (also LATA 3020)

Fall or spring. 1 credit. Staff.

Spanish-language discussion section supplementing the course materials during the lecture section including conversation in Spanish and discussion of course lecture in Spanish.

SPAN 3100 Advanced Spanish Conversation and Pronunciation

Fall or spring. 3 credits. *Satisfies Option 1 of language requirement.* Prerequisite: SPAN 2190 or CASE Q++. B. Teutli.

Conversation course with intensive oral practice obtained through the production of video programs. Students practice the fundamental aspects of communication in the standard spoken and written Spanish, with some focus on dialectal variations. There are weekly pronunciation labs.

SPAN 3110 Advanced Spanish Writing Workshop

Fall or spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: SPAN 2190 or CASE Q++ or equivalent. C. Lawless and staff.

This course, which is required for the major, is designed to help the learner develop increased accuracy and sophistication in writing in Spanish for academic purposes. To this end, there will be ample writing and revising practice, with a focus on specific grammatical and lexical areas, customized to the needs of the students enrolled in the course. SPAN 3110 may be taken concurrently with SPAN 2140, 2150, or 2170.

SPAN 3170 Creative Writing Workshop (in Spanish)

Fall. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: SPAN 2140, 2150, 2170, or 2190, or CASE Q++, or permission of instructor. Conducted in Spanish. E. Paz-Soldán.

Focuses on the practice of narrative writing in Spanish. Explores what makes a novel and a short story work, paying close attention to narrative structure, plot, beginnings/endings, character development, theme, etc. Students read classic novels and short stories as points of departure for the discussion. Because the course is a workshop, students are expected to write their own fiction.

SPAN 3300 Literature and the Arts (LA-AS)

Fall. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisites: SPAN 2140, 2150, or 2170, or permission of instructor. J. M. Rodríguez-García.

Literature is just one of many genres and media that artists have used to capture the ongoing transformations in our ways of looking at reality. The dialogue between literature and other artistic productions (e.g., painting, music, sculpture) will be the main focus of this course, whose topics may feature one or more of the following combinations: the interface of poetry and the visual arts, of fiction and cartography, and of avant-garde writing and technology-based modes of representation, among others.

SPAN 3540 Stages: Theater of Early Modern Spain # (CA-AS)

Spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisites: SPAN 2140, 2150, or 2170, or permission of instructor. S. Pinet.

This is a survey course of theater of Golden Age Spain. Historical development of the genre within a Spanish and European context will be emphasized, while addressing questions of literary history, social context, the space of the stage, evolving structure of the "comedia," etc. Authors may include Lope de Vega, Tirso de Molina, Calderón de le Barca, Juan Ruiz de Alacón, Augustín Moreto, Sor Juana Inés de la Cruz.

SPAN 3600 Autobiographical Narrative and the Cuban Socialist Revolution (LA-AS)

Fall. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: SPAN 2140, 2150, 2170, or 2190, or CASE Q++, or permission of instructor. G. Aching.

This course examines the language through which various autobiographical subjects narrate their relationship to the Cuban Socialist Revolution from different perspectives. Beginning with Fidel Castro's pre-revolutionary speech, "La historia me absolverá," as an example of epic, republican discourse, the course focuses on Ernesto Che Guevara's description of the ideal relation between the revolutionary subject and socialism in "El hombre y el socialismo en Cuba"; Edmundo Desnoes' self-questioning narrator in the novel *Memorias del subdesarrollo*; Miguel Barnet's ethnographic rendering of Esteban Montejo's life story in *Biografía de un cimarrón*; and Reinaldo Arenas' description of his life under the socialist regime as "persona non grata" in *Antes que anochezca*. The critical framework for these readings consists of a variety of reflections on subjectivity and autobiographical writing, such as Karl Marx's *Communist Manifesto*, selected excerpts from Judith Butler's *The Psychic Life of Power*, and Sylvia Molloy's *At Face Value: Autobiographical Writing in Spanish America*.

SPAN 3930 Contemporary Latino Writers (also LASP 3930) (LA-AS)

Spring. 4 credits. D. Castillo.

This course looks at the work of a number of women from different racial, geographical, social class, and linguistic backgrounds, and we read works by U.S.-based authors who write in English, Spanish, and Spanglish. We explore some of the rich heritage of Latinas in a variety of genres, including poetry, narrative fiction, essay, theater, and film. We will include texts by writers like Lucha Corpi, Lorna Dee Cervantes, Cherrie Moraga, Migdalia Cruz, Ana Castillo, Lourdes Portillo, and Patricia Cardoso. Opportunities are provided for those students who wish to develop nontraditional responses to the fiction and essays.

SPAN 3940 Spanish Cinema: The Sinister, The Satirical, and The Scandalous

Spring. 4 credits. *Satisfies Option 1 of language requirement.* Prerequisite: SPAN 2140, 2150, 2170, or CASE Q++, or permission of instructor. Conducted in Spanish. P. Keller.

This course offers an in-depth survey of Spanish films directed and produced between the years of 1950 and 1975. In addition to studying what some argue to be Spain's three greatest directors of all time—the three "Bs" (Luis Buñuel, Juan Antonio Brademk, and Luis García Berlanga)—we will also examine films by Carlos Saura, Basilio Martín Patino, Vicente Escrivá, Victor Erice, and Fernando Fernán Gómez. The course will also focus on common thematic and stylistic tropes among directors considered to be at the forefront of the Nuevo cine español, or Spanish New Wave Cinema. Other topics to be discussed include: the politics of censorship, exile, aperturismo, the Salamanca and Barcelona schools, violence and language, dictatorship, the gaze and structure of desire. All film viewings are mandatory and will be scheduled outside of class. Supplemental readings will provide historical context and background,

biographical information, and introduction theory and criticism.

SPAN 4150 Negritude and Negritude: Africanist Poetics and Politics (also SPAN 6150, FREN 4150/6150) @ (LA-AS)

Fall. 4 credits. Open to students with very good reading knowledge of both Spanish and French. G. Aching.

This course examines the dynamic though often tense convergence of ethnographic writing, surrealist practices, communist politics, and anti-colonialism in the Spanish and French-speaking Caribbean from roughly 1925 to 1945. Even though we will have the opportunity to explore significant aspects of these social, artistic, and political activities in the region during this period, our principal goal is to analyze how these rival activities informed the discourses of "negritude" and "négritude" and provided them with their artistic and political radicalism. Primary readings include works by Luis Palés Matos (from *Tuntún de pasa y grifería*) Nicolás Guillén (*Motivos de son*), Emilio Ballagas (from *Cuaderno de poesía negra*), Alejo Carpentier (*Ecué Yamba-O*), Lydia Cabrera (from *Cuentos negros*), Aimé Césaire (*Cabier d'un retour au pays natal*), Jean Price-Mars (*Ainsi Parla l'oncle*), Jacques Roumain (*Gouverneurs de la rosée*), and Léon Damas (from *Pigments*). These readings will be placed in dialogue with writings by Freud, André Breton, Suzanne Césaire, José Ortega y Gasset, Jean-Paul Sartre, René Ménil, José Lezama Lima, Josaphat Kubayanda, A. James Arnold, Michael J. Dash, and others. We will also examine a limited number of works of art by Pablo Picasso and Wilfredo Lam.

SPAN 4190–4200 Special Topics in Spanish Literature

4190, fall; 4200, spring. 2–4 credits each semester. Prerequisite: permission of instructor. Staff.

Guided independent study of special topics.

SPAN 4290–4300 Honors Work in Spanish

4290, fall; 4300, spring (yearlong). 8 credits. R grade given at end of fall semester and final grade at end of spring semester. Open to junior and seniors. Consult director of honors program for more information. Staff.

SPAN 4500 Literature of the Conquest (also SPAN 6500) (LA-AS)

Spring. 4 credits. Conducted in Spanish. M. Antonia Garcés.

This course examines the cultural and psychological impact of the "Discovery" on the literatures of the Old and the New World. In a voyage that takes us from the Caribbean to the mesetas of ancient Mexico and the Andean regions of South America, we will explore the formation of various discourses of the New World through a close reading of 16th- and 17th-century European and Amerindian texts. Particular attention will be paid to the formation of an "American discourse" in the literary subjects who launched a counteroffensive against the political views of the colonizers. Reading selections may be drawn from Columbus, Cabeza de Vaca, Bartolome de las Casas, Hernán Cortes, Bernal Díaz, Aztec and Maya testimonies on the Conquest, Michel de Montaigne, Pederico Cieza de Leon, Inca Garcilaso de la Vega, Guaman Poma, and Alonso de Ercilla, among others.

SPAN 4550 Don Quijote (also SPAN 6530) # (LA-AS)

Fall. 4 credits. Prerequisite: SPAN 2170 and one of the following two courses: SPAN 2140 or 2150, or permission of instructor. Conducted in Spanish. M. A. Garcés.

Don Quijote is not only the first modern work of literature, as Foucault noted, but also the first European novel, as the Czech novelist Kundera hailed it. In fact, Foucault believed that Cervantes' discovery of the arbitrary relation of words and things ushered in the modern age. A revolutionary document of its own age, *Don Quijote* confronts us with the complex history of Christians, Jews, and Muslims in early modern Spain, especially, with the conflicts between Christianity and Islam in the Iberian Peninsula and the Mediterranean. Four centuries before Freud, Cervantes questioned the meaning of madness, inspiring into the close bonds between delusions and fantasy, dreams and artistic production. Stressing a critique of creation with Cervantes' own creation, our close reading of *Don Quijote* will explore its links to the network of institutions, practices, and beliefs that constituted early modern Spanish culture.

SPAN 4600 More than Meets the Eye: Early 20th-Century Spanish Theater as Theory

Fall. 4 credits. M. Balsa.

This seminar aims to provide an overview of modern Brazilian literature and Brazilian critical theory for graduate students and advanced undergraduate students specializing in Latin America. It will cover the major literary movements and the essential canonical writers and cultural critics of 19th- and 20th- century Brazil. Some of the topics to be discussed are the formation of a national literature; literature and slavery; foreign models and rewritings; diverse definitions of national spaces and landscapes; relationships between aesthetic innovations and political issues and different literary definitions of frontiers, margins and exclusions. Authors to be read include Aluzio Azevedo, J. M. Machado de Assis, Mário de Andrade, Oswald de Andrade, Gilberto Freyre, Graciliano Ramos, Clarice Lispector, Caio Fernando Abreu, João Gilberto Noll, and Ana Cristina César. We will also be reading accompanying texts by Antônio Candido, Silviano Santiago, Roberto Schwarz, and Flora Süssekind, among others.

SPAN 4630 Modern Andean Literature (LA-AS)

Fall. 4 credits. J. E. Paz-Soldán.

This course examines the literary production of the Andean region (Perú, Bolivia, and Ecuador). Taking as our point of departure the early 20th century, we will examine issues such as the sociocultural heterogeneity of the region, which challenges the idea of a unified, modern nation-state; the tension of interethnic relations, and the emergence of indigenist cultural and political movements; the clashes between modernity and tradition, and the emergence of urban literature.

SPAN 4670 Modern Lyric Forms (CA-AS)

Spring. 4 credits. Conducted in Spanish. J. M. Rodríguez-García.

Literature is just one of the many genres and media that artists have used to capture the ongoing transformations in our ways of looking at reality. The dialogue between literature and painting will be the main focus of this course, whose topics include the literary representation of still-life scenes; the

modern artist's fascination with such disparate materials as clay and glass; the equation of artistic works with vessels—"vasos"—into which a meaning is poured; and the treatment of mass-produced commodities and gadgets as art works. The studied poems will most often be correlated with works in the visual arts that will be shown in class. We will also study two major texts by playwright Antonio Buero Vallejo that fictionalize the lives of the great Spanish painters Velázquez and Goya.

SPAN 4720 Between Fact and Fiction: The Documentary Tradition in Latin American Literature, Film, and Visual Arts (also PORT 4720) @ (CA-AS)

Spring. 4 credits. L. Horne.
For description, see PORT 4720.

SPAN 4750 Between Landscape and Loss: Visualizing Contemporary Spain (LA-AS)

Fall. 4 credits. This is the mandatory senior seminar for majors. P. Keller.
This course offers a survey of 20th-century Spanish culture by exploring texts centered on the theme of landscape and loss. The main aim of the class will be to think about representations of collective and individual experiences of loss through different literary genres and visual mediums. Some of the topics to be discussed will be loss of empire, exile, homecoming, nostalgia, mourning, existentialism, failure and hope. Another aim of the course will be to discuss the landscape as visual narratives that portray certain struggles for loss and recovery by examining texts that depict wounded or scarred spaces, uninhabitable homes, abandoned towns, and desolate, ghostly cities. An additional focus of the course will be to consider how trauma and memory are linked to the concept of "place," and thus to question the relationship between the poetics of place and the politics of loss. The course includes both canonical and non-canonical works and spans a range of genres (painting, documentary, short narrative, novel, essay, film, photography) dating from the early 1900s to the present. Among the artists we will look at are Unamuno, Salinas, Dalí, Buñuel, García Lorca, Cela, Llamazares, Erice, Saura, Suso de Toro, and Fontcuberta. Supplemental readings in Spanish history and introductory theory and criticism will be assigned to complement primary texts.

SPAN 4830 Macondo/McOndo (SBA-AS)

Spring. 4 credits. J. E. Paz-Soldán.
This course explores Latin American literature from the '60s onward, taking a look at the changing landscape, from the heyday of the Boom writers and Garcia Marquez' "magical realism," to urban fiction in the '90s. We will study authors such as Garcia Marquez, Manuel Puig, Daimela Elit, Roberto Bolano, Alberto Fuguet, Mario Bellatin, and Mayra Santos-Febres.

SPAN 6150 Negritude and Negritude: Africanist Poetics and Politics (also SPAN 4150, FREN 4150/6150)

Fall. 4 credits. Open to students with very good reading knowledge of both Spanish and French. G. Achting.
For description, see SPAN 4150.

SPAN 6240 Critical Theories: Marx and Freud in Latin America

Fall. 4 credits. B. Bosteels.
Seminar studying some of the most important models of critical theory available for the

study of literature, culture and society in Latin America. Particular attention is given to creative and theoretical works that elaborate upon the doctrines of Marx and Freud and their followers.

SPAN 6310 Subjectivity in the Slave Narrative

Spring. 4 credits. G. Achting.
This seminar will begin with a close reading of Hegel's section on self-consciousness, especially the sub-sections "Lordship and Bondage" and "Stoicism, Skepticism, and the Unhappy Consciousness" from *Phenomenology of Spirit*, and continue with selected chapters from Judith Butler's *The Psychic Life of Power*. We will follow these readings with an examination of interpretations of Hegel's theory of the subject in selected readings from W. E. B. Du Bois (*The Souls of Black Folk*); Orlando Patterson (*Slavery and Social Death*); Paul Gilroy (*The Black Atlantic*); Howard McGary and Bill E. Lawson (*Between Slavery and Freedom*); Susan Buck-Morss (*Hegel and Haiti*); and Ian Baucom (*Specters of the Atlantic*). The slave narratives that we will examine include Olaudah Equiano's *The Interesting Narrative of the Life of Olaudah Equiano*, Juan Francisco Manzano's *Autobiografía de un esclavo*, R. R. Madden's translation of Manzano's writings, Frederick Douglass' *Narrative of the Life of Frederick Douglass: An American Slave*; and Mary Prince's *The History of Mary Prince: A West Indian Slave Related By Herself*. We will also read "fictionalized" narratives of the experience of enslavement such as, Gertrudis Gómez de Avellaneda's *Sab*, Anselmo Suárez y Romero's *Francisco*, Antonio Zambrana's *El negro Francisco*, and Miguel Barnet's more contemporary *Biografía de un cimarrón*. This seminar will not focus on how the selected slave narratives seamlessly illustrate the validity of Hegel's theory of the subject; nor will it attempt to come up with a notion of black subjectivity. Rather, our readings and discussions will elucidate and examine (1) the tensions between abstraction and experience/history in the narrative construction of subjects who had indeed been enslaved; (2) the romantic imagination and sympathy and their articulations in British abolitionist and Cuban reformist discourses; and (3) sensibility and the production of gendered and racialized subjects. One of the seminar's goals will also be to interrogate specific relations between experiences of slavery and modernity.

SPAN 6390-6400 Special Topics in Spanish Literature

6390, fall; 6400, spring. 2-4 credits each semester. Staff.
Guided independent study for graduate students.

SPAN 6470 Theory of the Novel: Modernity's Subjects

Fall. 4 credits. S. Pinet.
Emerging in the wake of psychoanalysis, the theory of the novel is an effect of a new discourse on the subject within a modernity that sees itself as different and searches for a historical parallel. Focused on four late medieval Iberian genres that explore different possibilities for prose fiction, this course will alternate the reading of primary texts (*Amadis de Gaula*, *Cárcel de amor*, *La Diana*, *Lazarillo de Tormes*) with selected readings from canonical theorists of the novel, especially those of relevance to Hispanic literary criticism, which may include Lukács, Guillén,

Ortega y Gasset, Bakhtin, Jameson, Frye, Culler, Cascardi, Benjamin, Freud, Lévi-Strauss, assessing the possible consequences of this course's main hypothesis: that of the novel is simultaneously a theory of modernity and a theory of the subject.

SPAN 6500 Literature of the Conquest (also SPAN 4500)

Spring. 4 credits. Conducted in Spanish.
M. Antonia Garces.
For description see, SPAN 4500.

SPAN 6530 Don Quijote (also SPAN 4550)

Fall. 4 credits. M. A. Garcés.
For description, see SPAN 4550.

RUSSIAN

N. Pollak, chair; P. Carden, director of undergraduate studies (on leave spring 2010) (226B Morrill Hall, 255-8350); S. Paperno, director of Russian language program (226E Morrill Hall); W. Browne (on leave fall 2009), R. Krivitsky, S. Senderovich (on leave fall 2009), G. Shapiro (on leave fall 2009), V. Tsimberov. Visiting: K. Bättig von Wittelsbach, C. Golkowski, G. Nehler

For updated information, consult our web sites:

(literature) www.arts.cornell.edu/russian
(language) russian.cornell.edu

The Russian Major

Russian majors study Russian language, literature, and linguistics and emphasize their specific fields of interest. It is desirable, although not necessary, for prospective majors to complete RUSSA 1121-1122, 2203-2204, and RUSSL 2209 as freshmen and sophomores, because these courses are prerequisites to most of the junior and senior courses that count toward the major. Students may be admitted to the major upon satisfactory completion of RUSSA 1122 or the equivalent. Students who elect to major in Russian should consult the director of undergraduate studies as soon as possible. For a major in Russian, students are required to complete (1) RUSSA 3303-3304 or the equivalent, and (2) 18 credits from 3000- and 4000-level literature and linguistics courses, of which 12 credits must be in literature in the original Russian.

With the permission of the instructor, students may add 1 credit to certain literature courses by registering for RUSSA 4491. Such courses involve a one-hour section each week with work in the Russian language. Students may count two 1-hour credits toward the 12 hours of Russian literature in the original language required for the major.

Satisfying the Foreign Language Requirement

1. Options 1a and 1b:

1a. Any Russian-language (RUSSA) course totaling 3 or 4 credits at the 2000 level or above (with the exception of RUSSA 3300 Directed Study) satisfies the Arts and Sciences language requirement under Option 1a.

1b. After completing the prerequisites RUSSA 1121 and RUSSA 1122, students may satisfy the language requirement by taking RUSSL 2209. Students who qualify for RUSSL 2212 may satisfy the language requirement by

taking that course. Other RUSSL courses that are taught in Russian may also be used when appropriate.

2. Option 2:

- In two semesters: RUSSA 1103 and 1121 in the fall, RUSSA 1104 and 1122 in the spring.
- In three semesters: RUSSA 1121 in the fall, 1122 in the spring, 2203 the following fall.
- In four semesters: RUSSA 1121 in the fall, 1122 in the spring, 1125 the following fall, 1126 the following spring.

Study Abroad

Students from Cornell frequently participate in the Council on International Educational Exchange and the American Council of Teachers of Russian programs for language study, as well as other Russian language programs. Opportunities are available for study during the summer, a single semester, or the full year. Further information is available from Slava Paperno (226E Morrill Hall) in the fall, from Professor Wayles Browne in the Department of Linguistics (220 Morrill Hall) in the spring, and from the Cornell Abroad Office.

Honors. Students taking honors in Russian do individual reading and research and write an honors essay. Students planning to take honors should consult the director of undergraduate studies in their junior year.

Russian Language

Detailed information and schedules of the Russian language courses, as well as office hours of the instructors, are available at: russian.cornell.edu.

Suggested tracks for first- and second-year Russian language study:

- First-year intensive: 1103 + 1121 in the fall, 1104 + 1122 in the spring
- First-year nonintensive: 1121 in the fall, 1122 in the spring
- Second-year intensive: 1125 + 2203 in the fall, 1126 + 2204 in the spring
- Second-year nonintensive: 2203 in the fall, 2204 in the spring
- Second-year "mostly reading; lighter load": 1125 in the fall, 1126 in the spring

RUSSA 1103-1104 Conversation Practice

1103, fall; 1104, spring. 2 credits each semester. Students must enroll in one sec of 1103 and one sec of 1121 in fall, and one sec of 1104 and one sec of 1122 in spring. R. Krivitsky.

Reinforces the speaking skills learned in RUSSA 1121 and 1122. Homework includes assignments that must be done in the language lab or on the students' own computers.

RUSSA 1121-1122 Elementary Russian through Film

1121, fall; 1122, spring. 4 credits each semester. Prerequisite: for RUSSA 1122, RUSSA 1121. R. Krivitsky, S. Paperno, and V. Tsimberov.

Gives a thorough grounding in all the language skills: listening, speaking, reading and writing. Course materials include clips from original Russian films and television programs. Homework includes assignments

that must be done in the language lab or on the students' own computers.

RUSSA 1125-1126 Reading Russian Press

1125, fall; 1126, spring. 2 credits each semester. sec 1 for non-native speakers of Russian; sec 2 for native speakers of Russian. Prerequisite for 1125 sec 1: RUSSA 1122 or placement by department; prerequisite for 1126 sec 1: RUSSA 1125 or placement by department; prerequisite for 1125 and 1126 sec 2: placement by department. Times TBA with instructors.* See starred (*) note at end of RUSSA section. S. Paperno and V. Tsimberov.

The emphasis is on reading unabridged articles on a variety of topics from current Russian periodicals and web pages and translating them into English; a certain amount of discussion (in Russian) may also be undertaken.

RUSSA 2203-2204 Intermediate Composition and Conversation

2203, fall; 2204, spring. 3 credits each semester. *Satisfies Option 1.* Prerequisite: for RUSSA 2203, RUSSA 1122 and 1104, or RUSSA 1122 with grade higher than B, or placement by department; for RUSSA 2204, RUSSA 2203 or equivalent. R. Krivitsky, S. Paperno, and V. Tsimberov.

Guided conversation, translation, reading, pronunciation, and grammar review, emphasizing the development of accurate and idiomatic expression in the language. Course materials include video clips from an original Russian feature film and work with Russian web sites, in addition to the textbook.

RUSSA 3300 Directed Studies

Fall or spring. 1-4 credits, variable. Prerequisite: permission of instructor. Times TBA with instructor.* See starred (*) note at end of RUSSA section. Staff.

Taught on a specialized basis for students with special projects (e.g., to supplement a non-language course or thesis work).

RUSSA 3303-3304 Advanced Composition and Conversation

3303, fall; 3304, spring. 4 credits each semester. *RUSSA 3303 Satisfies Option 1.* Prerequisite: for RUSSA 3303, RUSSA 2204 or equivalent; for RUSSA 3304, RUSSA 3303 or equivalent. R. Krivitsky, S. Paperno, and V. Tsimberov.

Reading, writing, and conversation: current Russian films (feature and documentary), newspapers, television programs, Russian web sites, and other materials are used. In some years, completing interviews with native speakers of Russian is a component of RUSSA 3304.

RUSSA 3305-3306 Reading and Writing for Heritage Speakers of Russian

3305, fall; 3306, spring. 2-3 credits, variable. Prerequisite: placement by department. Times TBA with instructor.* See starred (*) note at end of RUSSA section. Course may be cancelled if enrollment is insufficient. S. Paperno and V. Tsimberov.

Intended for students who speak grammatically correct Russian but do not know Russian grammar and have not learned to read or write Russian well (or have not learned written Russian at all). The two courses are very similar and do not constitute a sequence. Each may be taught slightly faster or slower in a given year, depending on the needs and interests of the students. Two

classes a week teach writing and grammar and include related reading. These classes are required, and the students who take them receive 2 credit hours. The third (optional) class teaches reading and discussion, and grants an additional credit hour.

RUSSA 3308 Russian Through Popular Culture

Spring. 2-3 credits, variable. Prerequisite: RUSSA 3304 for non-native speakers of Russian; RUSSA 3305 or 3306 for heritage speakers of Russian; for all others with advanced knowledge of Russian, placement by department. Not open to fluent native speakers of Russian (recommended: RUSSA 3309/3310 and RUSSL courses). Conducted in Russian. Times TBA with instructor.* See starred (*) note at end of RUSSA section. R. Krivitsky.

Aims to expand the students' vocabulary and their comprehension, speaking, reading, and writing skills, as well as cultural competence, through a mosaic study and discussion of a variety of styles in contemporary Russian popular culture (1970s through the present). Course materials include traditional and urban folklore, film, animation, published texts (prose and poetry), and recordings of songs. Includes two or three essays or similar writing assignments. Work is distributed so that a student may attend all three weekly meetings for 3 credit hours or only two of the meetings for 2 credit hours.

RUSSA 3309-3310 Advanced Reading

3309, fall; 3310, spring. 4 credits each semester. *Satisfies Option 1.* Sec. 1 for non-native speakers of Russian; sec 2 for native speakers of Russian. Prerequisites: for sec. 1 of RUSSA 3309, RUSSA 2204; for RUSSA 3310, RUSSA 3309 or equivalent; for sec 2 of 3309 and 3310, placement by department. Two meetings per week. Times TBA with instructors.* See starred (*) note at end of RUSSA section. May be canceled if enrollment is insufficient. S. Paperno and V. Tsimberov.

Designed to teach advanced reading and discussion skills. In section 1, weekly reading assignments include 20-40 pages of unabridged Russian, fiction or nonfiction. In section 2, the weekly assignments are 100-130 pages. Discussion of the reading is conducted entirely in Russian and centered on the content of the assigned selection.

RUSSA 4401 History of the Russian Language (also LING 4417) (HA-AS)

Spring. 4 credits. W. Browne. For description, see LING 4417-4418.

[RUSSA 4403 Linguistic Structure of Russian (also LING 4443) (KCM-AS)]

Fall. 4 credits. Next offered 2010-2011. W. Browne.

For description, see LING 4443-4444.]

RUSSA 4413-4414 Advanced Conversation and Stylistics

4413, fall; 4414, spring. 2 credits each semester. Prerequisites: for RUSSA 4413, RUSSA 3304 or equivalent; for RUSSA 4414, RUSSA 4413 or equivalent. Times TBA with instructor.* See starred (*) note at end of RUSSA section. V. Tsimberov.

Involves discussion of authentic Russian texts and films (feature or documentary) in a variety of nonliterary styles and genres.

RUSSA 4491 Reading Course: Russian Literature in the Original Language

Fall or spring. 1 credit each semester.
Prerequisite: permission of instructor. Times TBA with instructor.* See starred (*) note at end of RUSSA section. Staff.

To be taken in conjunction with any Russian literature course at the advanced level. Students receive 1 credit for reading and discussing works in Russian in addition to their normal course work.

[RUSSA 6601 Old Church Slavonic (also LING 6663)]

Fall. 4 credits. Next offered 2010-2011. W. Browne.

For description, see LING 6663.]

[RUSSA 6602 Old Russian Texts (also LING 6662)]

Spring. 4 credits. Next offered 2010-2011. W. Browne.

For description, see LING 6662.]

RUSSA 6633-6634 Russian for Russian Specialists

6633, fall; 6634, spring. 1-4 credits, variable. Prerequisite: four years of college Russian or equivalent. Times TBA with instructor.* See starred (*) note at end of RUSSA section. Staff.

Designed for students whose areas of study require advanced active control of the language. Fine points of syntax, usage, and style are discussed and practiced. Syllabus varies from year to year.

[RUSSA 6651 Comparative Slavic Linguistics (also LING 6671)]

Fall. 4 credits. Next offered 2010-2011. W. Browne.

For description, see LING 6671.]

* For RUSSA courses marked "Time to be arranged with instructor(*)", bring your class schedule to the organizational meeting, usually held on the second or third day of the semester, where class meeting times will be chosen so as to accommodate as many students as possible. The date, time, and place of the organizational meeting is announced at russian.cornell.edu, and posted at the Russian Department office (226 Morrill Hall). You may also contact the department office at 255-8350 or e-mail russiandept@cornell.edu.

**For TBA courses taught by Wayles Browne, contact Professor Browne (ewb2@cornell.edu or 255-0712). Note that Professor Browne will be on leave in the fall term.

Russian Literature

A variety of courses is offered in Russian literature. Readings may be in English translation or in the original Russian or both (see course descriptions). Instruction often encompasses culture and intellectual history as well as literature. Some courses are cross-listed with appropriate departments.

First-Year Writing Seminars: consult the John S. Knight Institute brochure for times, instructors, and descriptions. Next offered 2011-2012.

[RUSSL 2207-2208 Themes from Russian Culture # (LA-AS)]

Spring. 3 credits. In translation. Offered alternate years; next offered 2010-2011. G. Shapiro.

These courses are based on lectures, discussions, and audio-visual presentations and cover various aspects of Russian culture, such

as literature, art, architecture, music, religion, philosophy, and social thought. RUSSL 2207 extends through the 18th century, and RUSSL 2208 covers the 19th and 20th centuries.]

RUSSL 2209 Readings in Russian Prose and Poetry # (LA-AS)

Fall. 3 credits. Reading in Russian; discussion in English. *Satisfies Option 1.* Prerequisite: for students with 2+ semesters of Russian language (RUSSA 1121/1122 or equivalent), N. Pollak.

Short classics of the 19th and early 20th centuries, including Pushkin, Lermontov, Tolstoy, Chekhov, Blok, Akhmatova. Assignments adjusted for native fluency. May be used as a prerequisite for RUSSL 3300-4400 courses with reading in Russian.

RUSSL 2212 Readings in 20th-Century Russian Literature (LA-AS)

Spring. 3 credits. Reading, writing, and discussion in Russian. *Satisfies Option 1.* G. Shapiro.

Designed for students with native background needing a course to satisfy the language requirement. Goals are to introduce students to 20th-century Russian literature in the original and to improve their Russian reading and writing skills. Readings are from 20th-century masters such as Bunin, Bulgakov, and Nabokov. May be used as a prerequisite for RUSSL 3300-4400 courses with reading in Russian.

[RUSSL 2279 The Russian Connection, 1830 to 1867 (also COML 2790) # (LA-AS)]

Fall. 4 credits. In translation. Next offered 2010-2011. Staff.

Examines Russian prose of mid-19th century (Lermontov, Tolstoy) against background of European prose (Rousseau, Musset, Stendhal, Thackeray, et al.).]

[RUSSL 2280 The Russian Connection, 1870 to 1960 (also COML 2800) (LA-AS)]

Fall. 4 credits. In translation. Next offered 2010-2011. Staff.

Examines the Dostoevskian novel against background of European prose (Diderot, Camus, Sarraute, et al.)]

[RUSSL 3331 Introduction to Russian Poetry # (LA-AS)]

Spring. 4 credits. Reading in Russian; discussion in English. Prerequisite: proficiency in Russian or permission of instructor. May be counted toward 12 credits of Russian literature in original language for Russian major. Next offered 2011-2012. Staff.

A survey of Russian poetry, with primary emphasis on the analysis of individual poems by major poets.]

[RUSSL 3332 Russian Drama and Theater (also THETR 3220) # (LA-AS)]

4 credits. In translation. Next offered 2011-2012. Staff.

19th- to 20th-century plays (Gogol, Ostrovsky, Chekhov). Historical period, cultural atmosphere, literary trends.]

[RUSSL 3333 20th-Century Russian Poetry (LA-AS)]

4 credits. Reading in Russian; discussion in English. May be counted toward 12 credits of Russian literature in original language for Russian major. Next offered 2010-2011. N. Pollak.

Close readings of lyrics by major 20th-century poets.]

[RUSSL 3334 The Russian Short Story # (LA-AS)]

4 credits. Reading in Russian; discussion in English. Prerequisite: proficiency in Russian or permission of instructor. May be counted toward 12 credits of Russian literature in original language for Russian major. Next offered 2011-2012. Staff.

Survey of two centuries of Russian storytelling. Analysis of individual stories by major writers. Emphasis on narrative structure and on related landmarks of Russian literary criticism.]

RUSSL 3335 Gogol # (LA-AS)

Spring. 4 credits. G. Shapiro.

Selected works of Gogol are read closely in translation and viewed in relation to his life and to the literature of his time.

[RUSSL 3337 Films of Russian Literary Masterpieces (LA-AS)]

4 credits. In translation. Next offered 2011-2012. Staff.

Comparative analysis of American films based on Russian novels: *War and Peace* and *Dr. Zhivago*. Problems of translation between media and cultures.]

[RUSSL 3338 Lermontov's Hero of Our Time # (LA-AS)]

4 credits. Reading in Russian; discussion in English. Next offered 2010-2011. N. Pollak.

Hero of Our Time has been called the first major Russian novel. Close reading, attention to linguistic and literary problems.]

[RUSSL 3350 Education and the Philosophical Fantasies (also COML 3500) # (LA-AS)]

Fall. 4 credits. In translation. Next offered 2011-2012. Staff.

Fundamental issues of education explored through great works: Plato's *Republic*, Rousseau's *Emile*, and Tolstoy's *War and Peace*.]

[RUSSL 3367 The Russian Novel # (LA-AS)]

Spring. 4 credits. In translation. Students who read Russian may sign up for a discussion section of the Russian text for 1 credit (RUSSA 4491). Next offered 2011-2012. N. Pollak.

The rise of the Russian novel in the 19th century: Pushkin, Lermontov, Dostoevsky, Tolstoy, Chekhov.]

[RUSSL 3368 20th-Century Russian Literature (LA-AS)]

Spring. 4 credits. In translation. Students who read Russian may sign up for discussion of Russian text for 1 credit (RUSSA 4491). Next offered 2011-2012. G. Shapiro.

Survey of 20th-century Russian prose, including such writers as Bunin, Bulgakov, and Nabokov, as well as Solzhenitsyn, Shalamov, and Voinovich.]

RUSSL 3369 Dostoevsky # (LA-AS)]

Fall. 4 credits. In translation. Limited to 40 students. P. Carden.

A survey of Dostoevsky's major novels: *Notes from Underground*, *Crime and Punishment*, *The Idiot*, and *The Brothers Karamazov*.

[RUSSL 3373 Chekhov in the Context of Contemporary European Literature and Art # (LA-AS)]

4 credits. In translation. Next offered 2010-2011. Staff.

Anton Chekhov's stories in the context of the European art of the short story and

contemporary paintings. Readings in English translation.]

[RUSSL 3385 Reading Nabokov (also ENGL 3790) (LA-AS)]

4 credits. In translation. Limited to 18 students; priority given to seniors. Next offered 2010–2011. G. Shapiro.

Nabokov's Russian works in translation from *Mary* to *The Enchanter*, and two novels he wrote in Ithaca while teaching literature at Cornell, *Lolita* and *Invitation of a Beheading*.]

[RUSSL 3393 Honors Essay Tutorial]

Fall and spring, 8 credits. Must be taken in two consecutive semesters in senior year; credit for first semester is awarded upon completion of second semester. For information, see director of undergraduate studies. Times TBA with instructor. Staff.

[RUSSL 4409 Russian Stylistics (LA-AS)]

Spring, 4 credits. Also open to graduate students. Prerequisite: proficiency in Russian or permission of instructor. This course may be counted toward the 12 credits of Russian literature in the original language for the Russian major. S. Senderovich.

Beyond normative grammar. Introduction to idiomatic Russian (morphology, syntax, vocabulary, phraseology) and genres of colloquial and written language. Development of writing skills.

[RUSSL 4415 Post-Symbolist Russian Poetry (LA-AS)]

4 credits. Reading in Russian; discussion in English. Prerequisite: proficiency in Russian or permission of instructor. This course may be counted toward the 12 credits of Russian literature in the original language for the Russian major. Next offered 2010–2011. N. Pollak.

Verse, critical prose, and literary manifestos by selected early 20th-century Russian poets, including Annenskii, Pasternak, and Mandelstam.]

[RUSSL 4430 Practice in Translation (LA-AS)]

Spring, 4 credits. Prerequisite: proficiency in Russian or permission of instructors. N. Pollak.

Practical workshop in translation: documents, scholarly papers, literary works (prose and poetry). Mostly Russian to English, some English to Russian.

[RUSSL 4432 Pushkin # (LA-AS)]

Spring, 4 credits. Reading in Russian; discussion in English. Prerequisite: proficiency in Russian or permission of instructor. May be counted toward 12 credits of Russian literature in original language for Russian major. S. Senderovich.

Selected works by Pushkin: lyrics, narrative poems, and *Eugene Onegin*.

[RUSSL 4433 Short Works of Tolstoy # (LA-AS)]

4 credits. Reading in Russian; discussion in English. Prerequisite: RUSSL 2209 or 2212 or equivalent mastery of Russian language skills. Next offered 2011–2012. Staff.

A selection of short stories and short novels in Russian. Attention to style, themes, idioms. Assignments adjusted to students' language capabilities.]

[RUSSL 4492 Supervised Reading in Russian Literature]

Fall or spring, 1–4 credits each semester. Independent study. Prerequisite: students must find an advisor and submit a plan before signing up. Times TBA with instructor. Staff.

[RUSSL 4493 Anton Chekhov # (LA-AS)]

4 credits. Reading in Russian; discussion in English. Prerequisite: proficiency in Russian or permission of instructor. Next offered 2011–2012. Staff.

Major works of Chekhov in Russian; focus on style and language. Readings include stories ("Anna on the Neck," "Darling," "Steppe") and plays (*Uncle Vanya* and *Seagull*.)]

[RUSSL 4499 The Avant-Garde in Russian Literature and the Arts (LA-AS)]

Fall, 4 credits. Reading in Russian; discussion in English. Prerequisite: proficiency in Russian or permission of instructor. P. Carden.

Literature, theater, and the visual arts in the richly innovative period 1890–1920.

Graduate Seminars

[RUSSL 6611 Supervised Reading and Research]

Fall or spring, 2–4 credits each semester. Prerequisite: proficiency in Russian or permission of instructor. Times TBA with instructor. Staff.

Related Languages

Note: Completion of the 1131–1132–1133–1134 sequence in HUNGR/POLSH/SEBCR fulfills the Option 2 language requirement.

Czech

[CZECH 3300 Directed Studies]

Spring, 1–4 credits, variable. Prerequisite: permission of instructor. Times TBA with instructor.** See double-starred (**) note at end of UKRAN section. Staff.

Taught on a specialized basis to address particular student needs.]

Hungarian

[HUNGR 1131–1132 Elementary Hungarian]

3 credits. Prerequisite: for 1132: HUNGR 1131 or permission of instructor. G. Nehler. Teaches the basic grammar of Hungarian. Designed to aid the student in all facets of language acquisition: speaking, listening comprehension, reading, and writing. Second-semester Hungarian (1132) teaches more advanced grammar of the language at an intermediate level.

[HUNGR 1133–1134 Continuing Hungarian]

1133, fall; 1134, spring, 3 credits. Prerequisite: for 1133, HUNGR 1132 or permission of instructor; for 1134, HUNGR 1133 or permission of instructor. Next offered 2010–2011. G. Nehler.

A conversation and reading course designed to aid the student in all facets of language acquisition: speaking, listening comprehension, reading, and writing. Fourth-semester Hungarian (1134) teaches more advanced instruction of the language at an intermediate level.]

[HUNGR 3300 Directed Studies]

Fall or spring, 1–4 credits, variable. Prerequisite: permission of instructor. Times TBA with instructor.** See double-starred (**) note at end of UKRAN section. Staff.

Taught on a specialized basis to address particular student needs.

[HUNGR 4427 Structure of Hungarian (also LING 4427) (KCM-AS)]

Spring. Next offered 2010–2011.]

Polish

[POLSH 1131–1132 Elementary Polish]

1131, fall; 1132, spring, 3 credits each semester. Prerequisite: for POLSH 1132, POLSH 1131 or equivalent. Offered alternate years; next offered 2010–2011. Staff.

Covers all language skills: speaking, listening comprehension, reading, and writing.]

[POLSH 1133–1134 Continuing Polish]

1133, fall; 1134, spring, 3 credits each semester. Prerequisites: for POLSH 1133, POLSH 1132 or permission of instructor; for POLSH 1134, POLSH 1133 or equivalent. Times TBA with instructor. **Offered alternate years. See double-starred (**) note at end of UKRAN section. Staff.

An intermediate conversation and reading course.

[POLSH 3300 Directed Studies]

Fall or spring, 1–4 credits, variable. Prerequisite: permission of instructor. Times TBA with instructor.** See double-starred (**) note at end of UKRAN section. Staff.

Taught on a specialized basis to address particular student needs.

[POLSH 3301 Polish through Film and Literature (LA-AS)]

3 credits. *Satisfies Option 1.* Prerequisite: POLSH 1134 or permission of instructor. Times TBA with instructor.** See double-starred (**) note at end of UKRAN section. Next offered 2010–2011. C. Golkowski.

Language proficiency and insight into Polish culture through videos, films, and contemporary texts. Listening and reading comprehension, conversation, grammar review.]

Serbo-Croatian

[SEBCR 1131–1132 Elementary Serbo-Croatian]

1131, fall; 1132, spring, 3 credits each semester. Prerequisite for SEBCR 1132: SEBCR 1131 or equivalent. Times TBA with instructor. ** Offered alternate years. See double-starred (**) note at end of UKRAN section. Staff.

Covers all language skills: speaking, listening comprehension, reading, and writing. Includes Bosnian.

[SEBCR 1133–1134 Continuing Serbo-Croatian]

1133, fall; 1134, spring, 3 credits each semester. Prerequisite for SEBCR 1133: SEBCR 1132 or equivalent; for SEBCR 1134: SEBCR 1133 or equivalent. Times TBA with instructor.** See double-starred (**) note at end of UKRAN section. Offered alternate years; next offered 2010–2011. Staff.

An intermediate conversation and reading course.]

SEBCR 3300 Directed Studies

Fall or spring. 1-4 credits, variable.
Prerequisite: permission of instructor.
Times TBA with instructor.** See double-starred (**) note at end of UKRAN section.
Staff.

Taught on a specialized basis to address particular student needs.

[SEBCR 3302 Advanced Serbo-Croatian

3 credits. *Satisfies Option 1.* Prerequisite: SEBCR 1134 or permission of instructor.
Next offered 2010-2011. Staff.

Includes Bosnian with Croatian and Serbian. Intensive speaking and writing practice; grammar review. Fiction and nonfiction readings; videos reflecting contemporary South Slavic societies.]

Ukrainian**UKRAN 3300 Directed Studies**

Spring. 1-4 credits, variable. Prerequisite: permission of instructor. Times TBA with instructor.** See double-starred (**) note at end of section. Staff.

Taught on a specialized basis to address particular student needs.

**For these courses, contact the Russian department (russiandept@cornell.edu or 255-8350) for time and place of organizational meeting(s).

SANSKRIT

See "Asian Studies."

SCIENCE AND TECHNOLOGY STUDIES

S. Hilgartner, chair (304 Rockefeller Hall, 255-6043); K. Vogel (DUS), R. N. Boyd, P. R. Dear, S. H. Hilgartner, R. Kline, C. Leuenberger, B. V. Lewenstein, M. Lynch, T. J. Pinch, A. G. Power, R. Prentice, S. Pritchard, J. V. Reppy, M. W. Rossiter, P. J. Sengers, S. Seth, Emeritus: W. R. Lynn, L. P. Williams. Adjunct faculty: R. W. Miller, H. Shue, Z. Warhaft

In today's world, issues at the intersection of the technical and the social arise continually in all aspects of life, from the role of computers in society, the history of evolutionary theory, and the challenges of environmental controversies, to the ethical dilemmas of genomics and biomedicine. The field of science and technology studies (S&TS) addresses such issues through the study of the social aspects of knowledge, especially scientific and technological knowledge. S&TS explores the practices that shape science and technology, examines their social and cultural context, and analyzes their political and ethical implications. S&TS provides a strong liberal arts background from which students can go on to careers in law, medicine, environmental policy, business, and a variety of other professions where the social aspects of science and technology loom large.

The Science and Technology Studies Major

The Department of Science and Technology Studies has revised the major for students applying to the major, effective fall 2008.

Admission to the major requires successful completion of one S&TS course. First-Year

Writing Seminars may count as the pre-requisite, but not as part of the major. There are no other prerequisites, but students should plan to fulfill the science PBS and quantitative MQR requirements of the College of Arts and Sciences early in their college careers in order to be in a position to take additional science or engineering courses as outlined below.

Students intending to major in Science and Technology Studies should submit an application during their sophomore year. Juniors are considered on a case-by-case basis. The application includes (1) a one-page statement explaining the student's intellectual interests and why the major is consistent with the student's academic interests and goals; (2) a tentative plan of courses fulfilling S&TS requirements; and (3) an up-to-date transcript of work completed at Cornell University (and elsewhere, if applicable). Further information and application materials are available in 306 Rockefeller Hall (255-6047).

Requirements

S&TS majors must complete the following requirements:

(Note: all courses used to fulfill major requirements must be taken for a letter grade, which must be C- or higher.)

1. The core course (STS 2011)
2. Three additional 2000-level courses selected from the following list: STS 2021, 2051, 2061, 2331, 2501, 2811, 2821, 2851, 2861, 2871, 2921.
3. Additional S&TS courses to total 34 credit hours in the major. Four of these courses must be 3000 level or above and a minimum of two of these must be 4000 level or higher. STS 1101 and/or 1102 may be used to meet major requirements only if taken before joining the major or during your first two semesters in the major. Only one independent study (STS 3991) of no more than 4 credit hours may be taken to meet major requirements.
4. Science requirement: In addition to the science requirement of the College of Arts and Sciences, Science & Technology Studies majors are required to take an additional two courses in natural science or engineering (including computer science). Mathematics sufficient to provide background for the additional science requirement should be completed before undertaking that requirement. Choice of these courses should be made in consultation with the student's major advisor.

The Honors Program

The honors program is designed to provide independent research opportunities for academically talented S&TS majors. Students who enroll in the honors program are expected to do independent study and research, with faculty guidance, on issues in science and technology studies. Students who participate in the program should find the experience intellectually stimulating and rewarding whether or not they intend to pursue a research career. S&TS majors are considered for entry into the honors program at the end of the second semester of their junior year. To qualify for the S&TS honors program, students must have an overall Cornell cumulative grade point average (GPA) of at least 3.00 and a 3.30 cumulative GPA in

courses taken for the major. Additionally, the student must have formulated a research topic, and have found a project supervisor and a second faculty member willing to serve as the advisors; at least one of these must be a member of the S&TS department. More information on the honors program is available from the S&TS undergraduate office at 306 Rockefeller Hall (255-6047).

The Biology and Society Major

The Department of Science and Technology Studies also offers the Biology and Society major, which includes faculty from throughout the university. The Biology and Society major is designed for students who wish to combine the study of biology with exposure to perspectives from the social sciences and humanities. In addition to providing a foundation in biology, Biology and Society students obtain background in the social dimensions of modern biology and in the biological dimensions of contemporary social issues.

The Biology and Society major is offered to students enrolled in the College of Arts and Sciences, the College of Human Ecology, and the College of Agriculture and Life Sciences. The major is coordinated for students in all colleges through the Biology and Society office. Students can get information, specific course requirements, and application procedures for the major from the office in 306 Rockefeller Hall, 255-6047.

A full description of the Biology and Society major can be found on p. 498 of this catalog.

The Minor in Science and Technology Studies

S. Hilgartner, chair (304 Rockefeller Hall, 255-6043); K. Vogel (DUS); R. N. Boyd, P. R. Dear, R. Kline, C. Leuenberger, B. V. Lewenstein, M. Lynch, T. J. Pinch, A. G. Power, R. Prentice, S. Pritchard, J. V. Reppy, M. W. Rossiter, P. J. Sengers, S. Seth, Emeritus: W. R. Lynn, L. P. Williams. Adjunct faculty: R. W. Miller, H. Shue, Z. Warhaft

The minor in Science & Technology Studies (S&TS) is designed for students who wish to engage in a systematic, interdisciplinary exploration of the role of science and technology in modern societies. The minor is intended for students with varied academic interests and career goals. Majors in the natural sciences and engineering have an opportunity to explore the social, political, and ethical implications of their selected fields of specialization, while students majoring in the humanities and social sciences have a chance to study the processes, products, and impacts of science and technology from an S&TS perspective.

To satisfy the requirements for the S&TS minor, students must complete, with a letter grade of C- or above, a minimum of four courses selected from the course offerings listed for the major, excluding first-year writing seminars. The four courses must include STS 2011 and at least one course at the 3000 or 4000 level. No more than one course can be at the 1000 level. Interested students may obtain further information about courses and a list of course descriptions by contacting the S&TS undergraduate office, 306 Rockefeller Hall (255-6047).

Graduate Field of Science & Technology Studies

S. Hilgartner, (chair), T. Pinch (DGS), R. Boyd, P. Dear, R. Kline, S. Langwick, B. Lewenstein, M. Lynch, T. Gillespie, T. Hinrichs, A. Power, R. Prentice, S. Pritchard, W. Provine, J. Reppy, M. Rossiter, P. Sengers, S. Seth, K. Vogel. Minor Member: C. Leuenberger.

Students may obtain further information about the field and course offerings by contacting the S&TS graduate field office, 306 Rockefeller Hall (255-3810).

First-Year Writing Seminars

Consult the John S. Knight Institute web site for times, instructors, and descriptions: www.arts.cornell.edu/Knight_institute/index.html.

Introductory Courses

[STS 1101 Science and Technology in the Public Arena (SBA-AS)]

Fall. 3 credits. STS 1101 and 1102 may be taken separately or in any order. Recommended as introduction to field; not required and may not be used to fulfill a major requirement. Next offered 2011–2012. J. Reppy.

Introduction to public policy issues involving developments in science and technology. Studies such topics as secrecy and national security, the politics of expertise, public understanding of science, computers and privacy, and the management of risk. Applies concepts from the field of science and technology studies to analyze how issues are framed and public policy produced.]

STS 1102 Histories of the Future (CA-AS)

Spring. 3 credits. Recommended as introduction to field; not required and may not be used to fulfill a major requirement. STS 1101 and 1102 may be taken separately or in any order. R. Prentice.

From *Frankenstein* to *The Matrix*, science fiction and film have depicted contemporary science, technology, and medicine for almost two centuries. This course introduces students to historical and social studies of science and technology using science fiction films and novels, as well as key readings in science and technology studies. What social questions can fictional accounts raise that factual ones can only anticipate? How have “intelligent machines” from Babbage’s Analytical Engine to Hal raised questions about what it means to be human? What can Marvel Comics teach us about changes in science and technology? When can robots be women and, in general, what roles did gender play in scientific, technological, and medical stories? How was the discovery that one could look inside the human body received? How do dreams and nightmares of the future emerge from the everyday work of scientific and technological research?

Core Courses

STS 2011 What Is Science? An Introduction to the Social Studies of Science and Technology (also SOC 2100) (CA-AS)

Spring. 3 credits; also offered as writing-intensive 4-credit option, by permission only, and limited to 15 students. K. Vogel. Introduces some of the central ideas in the field of Science and Technology Studies (S&TS). As well as serving as an introduction

to students who plan to major in Biology and Society or in Science and Technology Studies, the course is aimed at students with backgrounds in either the sciences or the humanities who are challenged to think more critically about what we mean by science, what counts as scientific knowledge and why, and how science and technology intervene in the wider world. The course is a mixture of lecture, discussion, and other activities. The discussion sections are an integral part of the course and attendance is required. In addition, a series of written assignments throughout the semester and a take-home final during exam week compose the majority of the grade.

S&TS Courses

STS 2051 Ethical Issues in Health and Medicine (also BSOC 2051) (KCM-AS)

Fall. 4 credits. Limited to 150 students. S. Hilgartner.

For description, see BSOC 2051.

STS 2061 Ethics and the Environment (also BSOC 2061, PHIL 2460) (KCM-AS)

Spring. 4 credits. S. Pritchard. For description, see BSOC 2061.

STS 2331 Agriculture, History, and Society: From Squanto to Biotechnology (HA-AS)

Fall. 3 credits. M. Rossiter. Surveys the major themes in the development of agriculture and agribusiness in the United States in the 19th and 20th centuries. These include particular individuals (e.g., Liberty Hyde Bailey, Luther Burbank, G. W. Carver, Henry A. Wallace, and Norman Borlaug), the rise of government support and institutions (including U.S.D.A. and Cornell), noteworthy events (the dust bowl, World War II, and the environmental movement), and the achievements of the Green and “Gene” Revolutions.

STS 2501 Technology in Society (also ECE/ENGRG/HIST 2500) (HA-AS)

Fall. 3 credits. R. Kline. For description, see ENGRG 2500.

[STS 2811 Science in Western Civilization: Medieval and Early-Modern Europe up to Isaac Newton (also HIST 2810) # (HA-AS)]

Fall. 4 credits. Next offered 2010–2011. P. Dear.]

STS 2821 Science in Western Civilization: Newton to Darwin, Darwin to Einstein (also HIST 2820) # (HA-AS)

Spring. 4 credits. STS 2811 is *not* a prerequisite to 2821. S. Seth. For description, see HIST 2820.

STS 2851 Communication, Environment, Science, and Health (also COMM 2850)

Spring. 3 credits. B. Lewenstein. For description, see COMM 2850.

STS 2861 Science and Human Nature (also PHIL 2860) (KCM-AS)

Spring. 4 credits. R. Boyd. For description, see PHIL 2860.

STS 2871 Evolution (also BIOEE 2070, HIST 2870) (PBS)

Fall. 3 credits. W. Provine. For description, see BIOEE 2070.

STS 2921 Inventing an Information Society (also ECE/ENGRG 2980, HIST 2920) (HA-AS)

Spring. 3 credits. R. Kline. For description, see ENGRG 2980.

STS 3011 Life Sciences and Society (also BSOC 3011) (SBA-AS)

Fall. 4 credits. M. Lynch. For description, see BSOC 3011.

STS 3111 Sociology of Medicine (also SOC 3130) (SBA-AS)

Fall. 4 credits. Not open to freshmen. C. Leuenberger.

This course provides an introduction to the ways in which medical practice, the medical profession, and medical technology are embedded in society and culture. We will ask how medicine is connected to various sociocultural factors such as gender, social class, race, and administrative cultures. We will examine the rise of medical sociology as a discipline, the professionalization of medicine, and processes of medicalization and demedicalization. We will look at alternative medical practices and how they differ from and converge with the dominant medical paradigm. We will focus on the rise of medical technology in clinical practice with a special emphasis on reproductive technologies. We will focus on the body as a site for medical knowledge, including the medicalization of sex differences, the effect of culture on nutrition and eating disorders such as obesity and anorexia nervosa. We will also read various classic and contemporary texts that speak to the illness experience and the culture of surgeons, hospitals, and patients and we will discuss various case studies in the social construction of physical and mental illness.

STS 3181 Living in an Uncertain World: Science, Technology and Risk

Fall. 4 credits. S. Pritchard. This course explores the history, sociology, and ethics of risk. In particular, we will focus on the complex and often ambiguous relationship between science, technology, and risk. A historical perspective shows how science and technology have generated risks while they have also played key roles in managing and solving those very risks. By examining several case studies, including 19th-century mining, the 1911 Triangle fire, nuclear science, the space shuttle disasters, asbestos litigation, Hurricane Katrina, and the contemporary financial crisis, we will consider how risk and ideas about risk have changed over time. By exploring different historical and cultural responses to risk, we will examine the socio-political dimensions of the definitions, perceptions, and management of risk both in the past and the present.

[STS 3221 Lives of Scientists and Engineers (also FGSS 3221) (HA-AS)]

Spring. 4 credits. Next offered 2010–2011. M. Rossiter.

This course will explore the lives of a variety of scientists and engineers—American, international, men, women, and minorities—through readings of biographies, autobiographies, and other sources. The goal will be to examine the obstacles overcome, opportunities offered, and choices made; the reasons and rationalization given; and the uses made of idealized biographies in science education, requirement, myth-making, and national prestige. Weekly readings, discussion, and research paper required.]

STS 3241 Environment and Society (also DSOC/SOC 3240) (SBA-AS)

Spring. 3 credits. G. Gillespie.
For description, see DSOC 3240.

STS 3301 Making Modern Science (also HIST 3290) (HA-AS)

Fall. 4 credits. S. Seth.
Examines the history of the physical sciences in Europe and the United States from 1800 to the present. Students study such topics as the development of thermodynamics and electrostatics, the quantum and relativity theories, science during the world wars, and post-war "big science." As well as a history of ideas, the course emphasizes the broader historical contexts in which physical science has been produced, focusing on issues raised in relation to Romanticism, the first and second industrial revolutions, social statistics, train travel, and the military-industrial-scientific complex, among others. Reading for the course ranges from primary source material (original papers by Thomson, Helmholtz, Planck, and Einstein) to extracts from Mary Shelley's *Frankenstein* and Michael Frayn's *Copenhagen*.

[STS 3311 Environmental Governance (also BSOC 3311, NTRES 3310) (CA-AS)]

Spring. 3 credits. Next offered 2010-2011.
S. Wolf.
For description, see NTRES 3310.]

STS 3431 Biotechnology and the Economy (also BSOC 3431)

Fall. 4 credits. J. Reppy.
In the three decades since Genentech was founded to exploit recombinant DNA technologies, the biotechnology industry has grown to be a multibillion-dollar industry, employing perhaps 200,000 workers (not to mention the trillions of microbial "workers" in some industrial applications). This course will survey the industry, with particular attention to biomedical applications. Topics will include the historical emergence of biotechnology as a separate industry in government statistics and popular discourse, the role of venture capital and small firms in industry growth, links to universities, intellectual property rights, and regulatory issues. The focus will be on the U.S. industry in the context of globalized economy. Readings include case studies, government reports, and background readings in innovation studies and emerging technologies.

STS 3460 Anthropology of the Body (also ANTHR 3465/6465, STS 6460) @ (CA-AS)

Fall. 4 credits. S. Langwick.
For description, see ANTHR 3465.

[STS 3491 Media Technologies (also COMM 3490, INFO 3490) (HA-AS)]

Spring. 3 credits. Offered odd-numbered years; next offered 2010-2011. T. Gillespie.
For description, see COMM 3490.]

[STS 3521 Science Writing for the Mass Media (also COMM 3520)]

Fall. 3 credits. *Students who take STS 3521 may not receive credit for COMM 2600, 2630, or 3520.* Next offered 2010-2011. B. Lewenstein.
For description, see COMM 3520.]

[STS 3551 Computers: From the 17th Century to the Dotcom Boom (also COMM 3550, INFO 3551) (HA-AS)]

Fall. 4 credits. No technical knowledge of computer use is presumed or required. STS 3551 and 3561 can be taken separately or in any order. Next offered 2011-2012. Staff.
How did computing technology, once useful only to technical specialists, come to colonize industry, academia, the military, and the home? This course will place computing technologies in social and historical context.]

STS 3561 Computing Cultures (also COMM/VISST 3560, INFO 3561) (CA-AS)

Spring. 4 credits. No technical knowledge of computer use presumed or required. STS 3551 and 3561 may be taken separately or in any order. R. Prentice.
Computers are powerful tools for working, playing, thinking, and living. Laptops, PDAs, webcams, cell phones, and iPods are not just devices, they also provide narratives, metaphors, and ways of seeing the world. This course critically examines how computing technology and society shape each other and how this plays out in our everyday lives. Identifies how computers, networks, and information technologies reproduce, reinforce, and rework existing cultural trends, norms and values. Looks at the values embodied in the cultures of computing and consider alternative ways to imagine, build, and work with information technologies.

STS 3601 Ethical Issues in Engineering Practice (also ENGRG 3600)

Spring. 3 credits. Limited to juniors and seniors only. P. Doing.
For description, see ENGRG 3600.

STS 3811 Philosophy of Science: Knowledge and Objectivity (also PHIL 3810) (KCM-AS)

Fall. 4 credits. R. Boyd.
For description, see PHIL 3810.

[STS 3911 Science in the American Polity, 1960 to Now (also AMST 3911, GOVT 3091) (SBA-AS)]

Spring. 4 credits. Next offered 2011-2012. S. Hilgartner.
This course reviews the changing political relations between science, technology, and the state in America from 1960 to the present. It focuses on policy choices involving science and technology in different institutional settings, such as Congress, the court system, and regulatory agencies. The tension between the concepts of science as an autonomous republic and as just another interest group is a central theme.]

STS 4001 Components and Systems: Engineering in a Social Context (also MAE 4000/4010)

Fall. 3 credits. Offered alternate years. Z. Warhaft.
For description, see MAE 4000.

[STS 4021 Bodies in Medicine, Science, and Technology (also BSOC/FGSS 4021) (CA-AS)]

Spring. 4 credits. Limited to 15 students. Next offered 2010-2011. R. Prentice.
Every day we are barraged with cultural messages telling us to eat better, get more exercise, stop smoking, practice safe sex. These messages make us insecure about our bodies: Am I thin enough, ripped enough, sexy enough? They are also contradictory: Fish makes you smarter; mercury in fish makes

you sick. Many of these messages use the language of science and medicine: There are obesity "epidemics" and chocolate "addictions." Our bodies are described and treated like machines: transplant surgeons talk about our "spare parts"; computer programmers describe their brains as "wetware." Our sense of our bodies may feel improvised, created on the fly from a collage of scientific, medical, cultural, and advertising snapshots. This course draws from literature in science and technology studies, anthropology, and feminist and gender studies to examine how bodies emerge from the shifting lessons of science, technology, and medicine, as well as how cultural and political concerns express themselves in and through bodies.]

STS 4071 Law, Science, and Public Values (also BSOC 4071) (SBA-AS)

Spring. 4 credits. M. Lynch.
Examines problems that arise at the interface of law and science. These problems include the regulation of novel technology, the role of technical expertise in public decision-making, and the control over scientific research. The first part of the course covers basic perspectives in science and technology studies (S&TS) and how they relate to legal decisions and processes. The second part covers a series of examples and legal cases on the role of expert judgments in legal and legislative settings, intellectual property considerations in science and medicine, and legal and political oversight of scientific research. The final part examines social processes and practices in legal institutions, and relates these to specific cases of scientific and technological controversy. Lectures and assignments are designed to acquaint students with relevant ideas about the relationship between legal, political, and scientific institutions, and to encourage independent thought and research about specific problems covered in the course.

[STS 4111 Knowledge, Technology, and Property (SBA-AS)]

Spring. 4 credits. Prerequisite: one course in science and technology studies. Next offered 2011-2012. S. Hilgartner.
This course examines the ownership of knowledge and technology, exploring fundamental tensions that intellectual property systems express and incompletely reconcile. Perspectives from science and technology studies, sociology, law, and economics inform the course. Case studies explore the construction of property in contexts ranging from the early history of copyright to the ownership of life forms, airwaves, algorithms, artistic content, electronic databases, and the personal identities of celebrities.]

[STS 4120 The Scientific Revolution in Early-Modern Europe (also HIST 4120) # (HA-AS)]

Spring. 4 credits. Next offered 2011-2012. P. Dear.]

[STS 4121 Science, Technology, and Culture (also COML 4100) (CA-AS)]

Fall. 4 credits. Next offered 2010-2011. A. Banerjee.]

STS 4131 Comparative Environmental History (also BSOC 4131) (HA-AS)

Fall. 4 credits. S. Pritchard.
Environmental history explores the historical relationships that have shaped human societies and the natural world. Four approaches will guide our study of environmental history: (1) The reciprocal

relationship between people and the environment, including the impact of human activities, such as subsistence, agriculture, transportation, industry, and city-building on the environment, and the influence of geography, natural resources, and the environment on human society. (2) The role of race, class, and gender in shaping the relationship between peoples and the environment. (3) The social construction of environmental knowledge, including ideas such as conservation versus preservation, wilderness and national parks, and natural resources and sustainable development. (4) The role of the state, imperialism, and foreign policy in shaping the relationship between nature and society across national boundaries. This course will take a global approach, allowing us to consider how world environmental history can inform the study of U.S. environmental history.

STS 4221 New York Women (also FGSS 4220, HIST 4451) (HA-AS)

Fall. 4 credits. Limited to 15 students. M. Rossiter.

Over the centuries New York State has been the site of activity for a great many women of consequence. This course is a one-semester survey of the past and present activities and contributions of rural and urban women in a variety of fields of interest to Cornell students politics, medicine, science, the law, education, business (including hotels), entertainment, communications, government, labor, religion, athletics, the arts and other areas. Weekly readings and discussion and a paper, possibly using local or university archives.

STS 4231 Gender and Technology (also BSOC/FGSS/HIST 4231) (HA-AS)

Spring. 4 credits. S. Pritchard.

Why are some technologies such as cars and computers associated with men and masculinity? How did vacuums and sewing machines become gendered female? How do technological artifacts and systems constitute, mediate, and reproduce gender identities and gender relations? How do technologies uphold gender hierarchies and thus social inequalities? This class explores the relationship between gender and technology in comparative cultural, social, and historical perspective. Specific themes include: meanings, camouflage, and display; socializations; industrialization, labor, and work; technologies of war; the postwar workplace; sex and sexuality; and reproductive technologies. Most course materials focus on western Europe and the United States since the late 18th century, but the issues raised in this class will prepare students to think about the relationship between gender and technology in other contexts including our own.

[STS 4291 Politics of Science (also BSOC 4291, GOVT 4293) (SBA-AS)

Fall. 4 credits. Next offered 2010–2011. R. Herring.]

STS 4311 From Surgery to Simulation (also BSOC 4311) (SBA-AS)

Fall. 4 credits. R. Prentice.

A cliché among medical professionals says, "If you have a hammer, every problem looks like a nail." In other words, treatment decisions often are dictated by available technologies. This course looks at medical technologies from dissection to X-rays to anti-depressants and the ways they shape how medical professionals look at and practice upon the human body. Takes a broad view of

technology, encompassing systems of practice that shape how work is conducted and the body is understood, as well as specific machines and treatments with specific uses. Considers how these technologies often are not only treatments for individual patients but also metaphors for larger cultural questions.

STS 4331 International History of Science # (HA-AS)

Spring. 4 credits. M. Rossiter.

Survey of the major scientific events and institutions in several foreign nations, including developing countries. Covers the period 1660 to the present and gives some attention to who in each country becomes a scientist, who rises to the top, and who emigrates. Weekly readings and a research paper.

STS 4361 Link, Network, Nexus (also BSOC 4361, COML 4115, FREN/SHUM 4936, GOVT 4748)

Spring. 4 credits. B. Massumi.

For description, see SHUM 4936.

[STS 4421 The Sociology of Science (also BSOC 4421, SOC 4420) (SBA-AS)

Spring. 4 credits. Next offered 2010–2011. T. Pinch.

A view of science less as an autonomous activity than as a social institution. Discusses such issues as controversies in science, analysis of scientific text, gender, and the social shaping of scientific knowledge.]

STS 4441 Historical Issues of Gender and Science (also FGSS 4440) (CA-AS)

Spring. 4 credits. Not open to freshmen. M. Rossiter.

A one-semester survey of women's role in science and engineering from antiquity to the 1980s, with special emphasis on the United States in the 20th century. Readings include biographies and autobiographies of prominent women scientists, educational writings and other primary sources, and recent historical and sociological studies. By the end of the semester, students attain a broad view of the problems that have faced women entering science and those that still remain.

STS 4471 Seminar in the History of Biology (also BIOEE 4670, BSOC 4471, HIST 4150) (PBS)

Summer or fall. 4 credits. Limited to 18 students. S–U or letter grades. W. Provine.

For description, see BIOEE 4670.

STS 4531 Knowledge and Society (also SOC 4530) (CA-AS)

Spring. 4 credits. Limited to 15 students. C. Leuenberger.

Focuses on the historical evolution of the sociology of knowledge as a theoretical paradigm and an empirical research field. Examines the phenomenological origins of the sociology of knowledge and many of its central texts. Studies how it has been applied to such areas as personhood, interaction, religion, identity, and the emotions. Also considers epistemological questions that arise, and cover various theoretical and empirical approaches that have been influenced by the sociology of knowledge such as ethnomethodology, conversation analysis, and the sociology of science and technology.

[STS 4581 Intelligibility in Science (also HIST 4581) (HA-AS)

Spring. 4 credits. Next offered 2012–2013. P. Dear.]

STS 4661 Public Communication of Science and Technology (also COMM 4660/6660, STS 6661)

Spring. 3 credits. Limited to 15 students. B. Lewenstein.

For description, see COMM 4660.

[STS 4711 The Dark Side of Biology: Biological Weapons, Bioterrorism, and Biocriminality (also BSOC 4711) (SBA-AS)

Fall. 4 credits. Next offered 2010–2011. K. Vogel.

For description, see BSOC 4711.]

STS 4751 Science, Race, and Colonialism (also HIST 4751) (HA-AS)

Spring. 4 credits. S. Seth.

This course examines the social construction and utilization of scientific conceptions of race in the West. We begin with the existence (or not) of conceptions of biological race in the early-modern period, focusing on early voyages of discovery and so-called "first encounters" between the peoples of the Old and New Worlds. In the second part of the course we will look at early enunciations of racial thought in the late 18th century and at the problems of classification that these raised, before examining the roots of "Scientific Racism." Part three looks at Darwin, Social Darwinism, and eugenics movements in different national contexts, concluding with a study of Nazi science and the subsequent trials of doctors at Nuremberg. The last part of the course examines recent and contemporary applications of racial thinking, including the debate over the origin of AIDS, race and IQ, and the question of whether doctors should make use of race as a category when researching and prescribing new treatments.

STS 4811 Philosophy of Science (also PHIL 4810, STS 6811) (KCM-AS)

Spring. 4 credits. R. Boyd and A. Chignell.

For description, see PHIL 4810.

[STS 4831 The Military and New Technology (also GOVT 4837) (SBA-AS)

Fall. 4 credits. Next offered 2011–2012. Staff.

Military organizations are seen paradoxically as both inflexible, hide-bound institutions and avid proponents of new technology. This course examines changes over time in the attitude of the military toward new technology and analyzes competing explanations for these changes. Have advances in technology altered the traditional notions of how battles are fought and won? Have military needs been a driver of new technology? Special attention will be given to the so-called "Revolution in Military Affairs" and the implications of the rise in asymmetric warfare for future developments in military technology.]

STS 4911 Vitality and Power in China (also BSOC 4911, HIST/SHUM 4931)

Spring. 4 credits. T. Hinrichs.

For description, see SHUM 4931.

STS 4921 The History of Reason (also BSOC 4921, HIST/SHUM 4932)

Spring. 4 credits. P. Dear.

For description, see SHUM 4932.

STS 4951 Social Studies of the Human Sciences (CA-AS)

Fall. 4 credits. C. Leuenberger.

Explores how the human and social sciences have provided the knowledge and categories we use to make sense of people and their

behavior. Looking across a range of disciplines—including sociology, psychology, psychiatry, and economics—the course examines how human beings have become objects of scientific investigation. Discusses the rise of the human sciences and their role in politics, culture, and society.

[STS 4961 Medicine and Healing in China (also ASIAN 4469, BSOC/HIST 4961) @ # (HA-AS)]

Spring. 4 credit. Next offered 2010–2011. T. Hinrichs.]

Independent Study

STS 3991 Undergraduate Independent Study

Fall, spring. 1–4 credits. No more than 8 credit hours total of independent study (not including honors) can count toward the S&TS major. Prerequisite: permission of instructor.

More information and applications available in 306 Rockefeller Hall.

STS 4991/4992 Honors Project

Fall and spring (yearlong)*. Prerequisite: senior S&TS students by permission of department; overall Cornell cumulative GPA of 3.00 and 3.30 cumulative GPA in courses taken for major. Apply in 306 Rockefeller Hall.

Students admitted to the honors program are required to complete two semesters of honors project research and to write an honors thesis. The project must include substantial research, and the completed work should be of wider scope and greater originality than is normal for an upper-level course. The student must find a project supervisor and a second faculty member willing to serve as faculty reader; at least one of these must be a member of the S&TS department.

*Students must register for 4 credits each semester, for a total of 8 credits. After the fall semester, students will receive a letter grade of "R" for the first semester with a letter grade for both semesters submitted at the end of the second semester whether or not they complete a thesis, and whether or not they are recommended for honors. Minimally, an honors thesis outline and bibliography should be completed during the first semester. In consultation with the advisors, the director of undergraduate studies will evaluate whether the student should continue working on an honors project. Students should note that these courses are to be taken in addition to those courses that meet the regular major requirements. If students do not complete the second semester of the honors project, they must change the first semester to independent study to clear the "R" and receive a grade. Otherwise, the "R" will remain on their record and prevent them from graduating.

Summer Course

STS 1451 Body, Mind, and Health: Perspectives for Future Medical Professionals (also BSOC 1451) # (CA-AS)

Summer. 3 credits. Open only to sophomore, junior, and senior high school students. M. Hurst.

This course surveys heated medical controversies from the Colonial Period to the present. Students learn about important debates over inoculation in the 18th century, sanity and insanity in the 19th century, and

venerable disease in the 20th century. Lectures and readings also map the changing experience and authority of men and women engaged in caring and curing. Because health and disease are culturally contingent, course materials explore the history of specific diseases including cholera and tuberculosis, syphilis and AIDS, anorexia nervosa and chronic fatigue syndrome. We consider why it is that certain diseases become more prevalent in one time period than another, and how gender, race, ethnicity, and region shape the experience of disease in America, both in the past and present. Finally, we also investigate some of the scientific, social, and ethical challenges facing medical and mental health professionals in the 21st century.

Graduate Seminars

[STS 6271 Making People Through Expert Knowledge]

Spring. 4 credits. Next offered 2011–2012. C. Leuenberger.

This seminar explores how the human and social sciences have provided the knowledge and categories we use to make sense of human beings and their behavior. Looking across a range of disciplines—including sociology, psychiatry, psychology, psychoanalysis, anthropology, and economics—we will look at how human beings have become objects of scientific investigation. We will focus on how culture, politics, and the professional environment impact the human sciences and how the use of rhetoric constitutes academic discourse. We will also focus on the social scientific construction of selves, sex, gender, and race.]

[STS 6281 Self and Society]

Fall. 4 credits. Next offered 2010–2011. C. Leuenberger.

How has the self become a political, scientific, and cultural project caught up in the ideological battles of modern times? What roles do cultural institutions, politics and science play in making human beings visible, understandable, and treatable? Students in this course will read and discuss texts at the intersection of sociology, cultural studies, history of the human and behavioral sciences, and science and technology studies that treat the self as a social construction. The course focuses on how culture, politics, science, as well as bureaucratic and economic imperatives help shape modern and postmodern conceptions of the self.]

STS 6301 Social Theory Information

Fall. 4 credits. R. Prentice.

Sociologist C. Wright Mills challenged his readers to develop their "sociological imagination" to understand the social and historical forces at work in seemingly individual events, such as the receipt of a pink slip, a draft card, or a drug prescription. Within science and technology studies, scholars have documented how social issues can become scientific, technological, or medical, often appearing to leave the social realm naturalized, normalized, or pathologized. This course introduces graduate students to classic texts and concepts in social theory with a focus on how scholars apply such theories to empirical research. It will consider major thinkers and schools of social thought, such as Marx, Weber, Durkheim, Mannheim, Foucault, and the Frankfurt School. It will also consider how a nuanced interplay of theory and empirical data can bring

critically important insights to both theoretical and empirical understandings of the world. The course is relevant for students in sociology, history, and anthropology who are interested in social theory.

STS 6311 Qualitative Research Methods for Studying Science (also SOC 6310)

Spring. 4 credits. C. Leuenberger.

Much has been learned about the nature of science by sociologists and anthropologists donning lab coats and studying scientists in action. This course looks at the methods used in this new wave of science studies. Examines what can be learned by interviewing scientists, from videos, and from detailed examinations of scientific texts. Students gain hands-on experience by conducting a mini-project in which they investigate some aspect of scientific culture.

[STS 6321 Inside Technology: The Social Construction of Technology (also SOC 6320)]

Spring. 4 credits. Next offered 2010–2011. T. Pinch.

Rather than analyze the social impact of technology upon society, this course investigates how society gets inside technology. In other words, is it possible that the very design of technologies embody assumptions about the nature of society? And, if so, are alternative technologies, which embody different assumptions about society, possible? Do engineers have implicit theories about society? Is technology gendered? How can we understand the interaction of society and technology? Throughout the course the arguments are illustrated by detailed examinations of particular technologies, such as the ballistic missile, the bicycle, the electric car, and the refrigerator.]

[STS 6341 Information Technology in Sociocultural Context]

Spring. 4 credits. Next offered 2010–2011. P. Sengers.

Analyzes information technology using historical, qualitative, and critical approaches. Discusses questions such as: In what ways is information technology—often portrayed as radically new—actually deeply historical? How do information technologies represent and intervene in debates and struggles among people, communities, and institutions? How is the design of information technology tools entangled in the realms of law, politics, and commerce? In what ways are the social consequences of information technologies produced as much by the claims we make about the technologies as about the raw functionality of the tools themselves? This course investigates these issues through the lenses of long-standing debates and current controversies.]

STS 6401 Science, Technology, Gender: Historical Issues (also FGSS 6400, HIST 6410)

Fall. 4 credits. S. Seth.

This course explores five, often interrelated, aspects of the literature on gender, science, and technology: (1) The historical participation of women (and men) in scientific work; (2) the embodiment of scientific, medical, and technical knowledge; (3) the scientific construction of sexuality; (4) the gendering of technological systems and artifacts; and (5) feminist critiques of scientific knowledge. We begin with an analysis of reason, gender, and sexuality in the classical and late-antique western world, before moving on to an

examination of the origins of modern western science in the scientific revolution, considering the claim that "science," by its very nature, is an androcentric enterprise. The rise of scientific and medical disciplines and professions in the 19th century will provide a focus for discussions of the systematic exclusion of women from the production of scientific knowledge at precisely the point that women's bodies become the object of intensive scientific study. Drawing on a range of material, the course considers the construction of homosexual and intersexual individuals in scientific discourse. In later weeks, we will discuss so-called "post-modernist" critiques of science, and will debate the possibilities for "feminist science."

STS 6460 Anthropology of the Body (also ANTHR 3465/6465, STS 3460)

Fall. 4 credits. S. Langwick.
For description, see ANTHR 3465.

STS 6661 Public Communication of Science and Technology (also COMM 6660/4660, STS 4661)

Spring. 4 credits. B. Lewenstein.
For description, see COMM 4660.

[STS 6801 Historical Approaches to Science (also HIST 6800)]

Fall. 4 credits. Prerequisite: graduate standing. Next offered 2010–2011. P. Dear. Examines philosophical, sociological, and methodological dimensions of recent historiography of science.]

STS 6811 Philosophy of Science (also PHIL 4810, STS 4811)

Spring. 4 credits. R. Boyd.
For description, see PHIL 6810.

[STS 7001 Special Topic 1: Science Studies and the Politics of Science]

Fall. 4 credits. Prerequisites: STS 7111 or permission of instructor. Next offered 2010–2011. M. Rossiter.

Theoretical developments in science and technology studies have called attention to the contingent and socially embedded character of both knowledge claims and technological systems. Drawing on literature from several disciplines, this seminar explores the consequences of these findings for social and political studies of science. Issues and problems considered include trust and skepticism, political and legal agency, reflexive institutions, relativism and social action, science and norms, and the co-production of knowledge and social order.]

STS 7003 Special Topic 3: Issues in the Social and Cultural History of Technology

Spring. 4 credits. R. Kline.
This seminar focuses on different issues in the social and cultural history of technology each semester. Typical issues include Gender and Technology, Rethinking Technological Determinism, Was there an Information Revolution?, Consumerism, and the Military and Technology in the United States. Students read and discuss exemplary books and articles on a topic for the first half of the course, then give presentations on their research papers.

STS 7111 Introduction to Science and Technology Studies (also HIST 7110)

Fall. 4 credits. M. Lynch and K. Vogel.
Provides students with a foundation in the field of science and technology studies. Using classic works as well as contemporary

exemplars, seminar participants chart the terrain of this new field. Topics for discussion include, but are not limited to: historiography of science and technology and their relation to social studies of science and technology; laboratory studies; intellectual property; science and the state; the role of instruments; fieldwork; politics and technical knowledge; philosophy of science; sociological studies of science and technology; and popularization.

Independent Study

STS 6991 Graduate Independent Study

Fall or spring. 2–4 credits. Permission of department required.
Applications and information are available in 306 Rockefeller Hall.

SCIENCE OF EARTH SYSTEMS

See "Department of Earth and Atmospheric Sciences."

SERBO-CROATIAN

See "Department of Russian."

SINHALA (SINHALESE)

See "Department of Asian Studies."

SOCIETY FOR THE HUMANITIES

Timothy Murray, Director

Fellows for 2009–2010

Timothy Campbell

Seeta Chaganti

Peter Dear

Keller Easterling

María Fernández

TJ Hinrichs

Mary Jacobus

Ruth Mas

Brian Massumi

Prita Sandy Meier

Martha Schoolman

Shu-Ling Stephanie Tsai

The society annually awards fellowships for research in the humanities. The fellows offer, in line with their research, seminars intended to be exploratory or interdisciplinary. These seminars are open to graduate students and suitably qualified undergraduates. The theme for 2009–2010 is "Networks/Mobilities."

SHUM 4821 Mobility and Invention (also ARTH/VISST 4821)

Fall. 4 credits. Limited to 15 students.
M. Fernández.

After 1940, numerous artists and intellectuals from various parts of the world emigrated or resided outside of their home countries for extended periods. Especially in Europe and the United States, immigrants significantly contributed to the formation of new fields of

knowledge and practice. While the migrant has been discussed at length in light of theories of hybridity, resistance, and cosmopolitanism, scholars have paid little attention to the migrant as inventor or creator. Are there conditions specific to the experience of migration that foster the generation and actualization of new ideas? Are theories of cosmopolitanism and translation sufficient to theorize immigrants' creativity? This seminar will function as a transdisciplinary laboratory for the exploration of these questions. Students from diverse fields and schools are welcomed.

SHUM 4822 Life as We Know It: Readings in the Biopolitical Paradigm (also COML 4065, ITAL 4822)

Fall. 4 credits. Limited to 15 students.
T. Campbell.

In this seminar we will be reading some of the most important philosophical contributions to what Giorgio Agamben has called the biopolitical paradigm, that is the increasingly intense ways in which biology and politics have come to be superimposed over one another across the last 30 years. After an initial foray into the writings of Hannah Arendt on life and politics, we turn to Michel Foucault and his seminars from the 1970s where the terms, biopolitics and biopower, are most forcefully introduced. In the remainder of the semester we will trace how iterations of the term in Foucault square with more recent philosophical reflections, most of which originate in Italy (Agamben, Virno, Negri). Finally, we'll turn to Roberto Esposito's deconstruction of the biopolitical paradigm.

SHUM 4823 Secular Disaffections: On Islam and the Politics of Emotion (also COML 4066, NES 4923, RELST 4823)

Fall. 4 credits. Limited to 15 students.
R. Mas.

This course takes as its focus the constitution of Islam by normative discourses of secular modernity in order to think about the categories of "religion" and "the secular." Special attention will be placed on the politics of secular liberal governance and the impacts that these have on the constitution of Muslim subjects, their bodies, and affects in the secular public sphere. We will examine the relationship of sentiments, feelings, emotions, and affect to the structures of force associated with secular models of politics that purport to banish religion from their sphere. Texts will include works by Talal Asad, Charles Hirschkind, Michel Foucault, Saba Mahmood, Brian Massumi, Jean-Luc Nancy, Jacques Rancière, Ann Stoler, and others.

SHUM 4824 Medieval Translation in Motion (also DANCE 4384, ENGL 4072, FREN 4824)

Fall. 4 credits. Limited to 15 students.
S. Chaganti.

This seminar will use movement studies to explore medieval traditions of translation. By foregrounding the role of movement in English and French medieval texts, the class will investigate how we might understand translation in terms of spatial as well as textual materiality. The syllabus will combine literary readings with historical and theoretical foundations. It will include classic studies of medieval translation theory; more recent work examining translation and cultural movement; and critical theories of space, translation, and motion. In addition to providing medievalist

students with a new perspective on some important texts, the course also offers nonmedievalists a critically inflected view of early literary self-reflection on translation.

SHUM 4825 African Port Cities: Empire Building at the Crossroads (also ARTH/VISST 4825, ASRC 4607)

Fall. 4 credits. Limited to 15 students.
P. Meier.

The coastal cities of the African continent have long been nodes of intercultural contact and diaspora. In such fluid borderlands, urban space and the built environment are a particularly fraught terrain, where boundaries of cultural belonging and identity are constantly being reworked. We will focus on the "Age of Empire" in order to consider Africa's multiple positions in the global market and diverse experiences of imperial and colonial aggression. This seminar therefore will examine key questions regarding how we conceive of port cities as "networked" sites. To this end we will seek to elucidate how the heterogeneous societies of coastal Africa transformed, fragmented, and reconstituted diverse material sites (including architecture, public space, sculpture, and the body) in order to assert local ways of being.

SHUM 4826 Extrastatecraft (also ARCH 4408, GOVT 4678, VISST 4826)

Fall. 4 credits. Limited to 15 students.
K. Easterling.

This seminar researches global infrastructures—the substrate of networks, subroutines, management styles, and standards that act as a medium of transnational polity. The material will examine how socio-technical networks of trade, communication, tourism, labor, transportation, energy, and finance have been theorized. From a number of fields including studies of organization, the material will assemble a relational understanding of the political agency or disposition inherent in these networks. The course will also consider techniques of dissensus alternative to the activist apparatus customarily assembled to meet this political reality.

SHUM 4931 Vitality and Power in China (also ASIAN 4429, BSOC/STS 4911, HIST/RELS 4931)

Spring. 4 credits. Limited to 15 students.
T. J. Hinrichs.

Chinese discourses have long linked the circulation of cosmic energies, political power, and bodily vitalities. In these models political order, spiritual cultivation, and health are achieved and enhanced through harmonizing these flows across the levels of Heaven-and-Earth, state, and humankind. It is when these movements are blocked or out of synchrony that we find disordered climates, societies, and illness. In this course, we will examine the historical emergence and development of these models of politically resonant persons and bodily centered politics, reading across primary texts in translation from these otherwise often separated fields. For alternate frameworks of analysis as well as for comparative perspectives, we will also examine theories of power and embodiment from other cultures, including recent scholarship in anthropology and critical theory.

SHUM 4932 The History of Reason (also BSOC/STS 4921, HIST 4932)

Spring. 4 credits. Limited to 15 students.
P. Dear.

This course will examine ways in which "reason" was understood, deployed, and contested in European thought and practice from the early-modern period through to the 20th century. We will read primary sources that theorize or employ notions of "reason" (Descartes, Hobbes, Newton, Hume, Kant, etc.). Theoretical controversy over the foundations of "reason" in political economy as well as in formal logic in the 19th century will also be studied, to counterpoint its practical uses in early anthropological work from the late 19th and 20th centuries on the notion of a "Great Divide" between western and non-western cultures.

SHUM 4933 Abolitionist Circuits (also ASRC/HIST 4933, ENGL 4073)

Spring. 4 credits. Limited to 15 students.
M. Schoolman.

An interdisciplinary seminar drawing on literary, historical, and geographical approaches to consider the roles of both physical transit and the geographic imaginary in 19th-century antislavery writing in English. Topics discussed will likely include the cross-border community of black activists living around the Great Lakes, the persistence of emigrationism throughout the antebellum period, abolitionist travel literature, and the historical existence and cultural deployment of the maroon communities in the Caribbean and the southern U.S. Primary texts will include works by William Wells Brown, Mary Ann Shadd Cary, Martin Delany, Ralph Waldo Emerson, Joseph John Gurney, Herman Melville, James Redpath, Harriet Beecher Stowe, and Samuel Ringgold Ward, as well as the unique resources available through Cornell's Samuel Joseph May Collection of abolitionist pamphlets.

SHUM 4934 Art Writing: Tracing the Visible (also ARTH/VISST 4934, ENGL 4074)

Spring. 4 credits. Limited to 15 students.
M. Jacobus.

"Art Writing" will take a psychoanalytic, phenomenological, and philosophic lens to visual art and writing about it. Seminars will cluster around looking, knowing, facing, fearing, feeling, and writing, as represented in both theory and the visual arts, including video-art and photography. We will read critics such as T. J. Clark and Mieke Bal alongside theorists such as Benjamin, Derrida, and Barthes. Case studies will focus on selected artists who have prompted rereadings or reinterpretations of the visual in their practice, including Richter, Viola, and Twombly. This course will be of interest to students of literature and art who also want to read visual culture and theory.

SHUM 4935 Subjectivation as Mode of Production—Zola's Department Store (also FREN 4935)

Spring. 4 credits. Limited to 15 students.
S. Tsai.

Subjectivation as mode of production, a conceptual device developed by Zola and further elaborated into the critique of the modernity by Foucault and Deleuze, evokes the genealogy of ethics and the production as a process of "becoming condition." Based on Emile Zola's novel *Au Bonheur des Dames* (1883), we will inquire into the production of subjectivity, or rather, the mode of existence, in the reign of the Second Empire in France.

SHUM 4936 Link, Network, Nexus (also BSOC/STS 4361, COML 4115, FREN 4936, GOVT 4748)

Spring. 4 credits. Limited to 15 students.
B. Massumi.

This course will consider a related constellation of philosophical conceptions of locality and globality, connection and continuity, which challenge common assumptions underlying present-day notions of the network. The philosophical paradigms to be examined include the concepts of the "nexus" and "extensive continuum" (A. N. Whitehead), "nonlocal linkage" and "transspatiality" (Raymond Ruyer), "intensity" and "multiplicity" (Bergson), "reticulation" (Gilbert Simondon), and "smooth space" (Deleuze/Guattari). These concepts will be deployed and their implications explored through a consideration of current issues, such as the military doctrine of "network-centric warfare" and network-oriented social-movement politics.

SOCIOLOGY

K. Weeden, chair (322 Uris Hall, 255-3820),
L. Auf der Heide, M. Berezin, M. Brashears,
B. Cornwell, D. Harris, D. Heckathorn,
E. Hirsh, E. Lawler, M. Macy, S. Morgan,
V. Nee, D. Strang, R. Swedberg, S. Tarrow,
S. Van Morgan, E. Wethington, E. York
Cornwell. Emeritus: S. Caldwell, B. C. Rosen

Sociology is the study of social life, social change, and the social causes and consequences of human behavior. Sociologists investigate the structure of groups, organizations, and societies, and how people interact within these contexts. Since all human behavior is social, the subject matter of sociology ranges from the intimate family to the hostile mob; from organized crime to religious cults; from the divisions of race, gender, and social class to the shared beliefs of a common culture; and from the sociology of work to the sociology of sports. In fact, few fields have such broad scope and relevance for research, theory, and application of knowledge.

Sociology provides many distinctive perspectives on the world, generating new ideas and critiquing the old. The field also offers a range of research techniques that can be applied to virtually any aspect of social life: street crime and delinquency, corporate downsizing, how people express emotions, welfare or education reform, how families differ and flourish, or problems of peace and war. Because sociology addresses the most challenging issues of our time, it is a rapidly expanding field whose potential is increasingly tapped by those who craft policies and create programs.

Requirements

In addition to the academic requirements established by the College of Arts and Sciences, students must also fulfill requirements for the Sociology major. Ten courses are required in the sociology major. All courses toward the major must be taken for a letter grade, and students must earn a C- or higher in each course. The courses required for the major are divided into the following categories:

- SOC 1101 Introduction to Sociology
- SOC 3750 Classical Theory

- SOC 3010 Evaluating Statistical Evidence
- seven additional (i.e., elective) courses in sociology

The Honors Program

Honors in sociology are awarded for excellence in the major, which includes overall GPA and completion of an honors thesis. In addition to the regular requirements of the major, candidates for honors must maintain a cumulative GPA of at least a A– in all sociology classes, complete SOC 4950 and 4960 (in the senior year), and write an honors thesis.

Students are awarded either honors (*cum laude*), high honors (*magna cum laude*), or highest honors (*summa cum laude*) in the program based on the honors advisors' evaluation of the level and the quality of the work completed towards the honors thesis and the quality of the course work. The honors distinction will be noted on the student's official transcript and it will also be indicated on the student's diploma.

Complete information on the major can be found on the department's undergraduate program web page: www.soc.cornell.edu/undergrad. In addition to regularly updated course lists, the web page provides an overview of the discipline of sociology, procedures for declaring the major and applying to the honors program, and strategies for locating research opportunities. The main department web site, www.soc.cornell.edu, provides an overview of the department's faculty members, their research, and the department's affiliated research centers.

Introductory Courses

SOC 1101 Introduction to Sociology (SBA-AS)

Fall, spring. 3 credits. *Students may not receive credit for both SOC 1101 and DSOC 1101.* B. Cornwell.

This course introduces students to sociological perspectives and methodologies. We will begin by considering sociological perspectives that focus on macro-level spheres of society (e.g., the economy, polity) and sweeping societal changes that have occurred within them over the past couple of centuries. The remaining bulk of the course introduces alternatives to these macro-oriented models of society. First, we will cover arguments that address the causes and consequences of individuals' integration into and contributions to society, and attempt to answer such questions as: Why do people follow seemingly irrational social norms? We will then complicate matters by considering explanations that assume that there is some measure of individual rationality behind individuals' behavior. Finally, we will consider how larger social forms, especially social networks, emerge through both rational and nonrational kinds of social action.

SOC 1104 Race and Ethnicity (SBA-AS)

Fall. 3 credits. L. Auf der Heide.

This course explores race and ethnicity from a sociological viewpoint. Topics will include, but aren't limited to: the social construction of race and ethnicity in the United States over time; historical and contemporary racism, prejudice, and discrimination; the relationships between race/ethnicity and educational achievement/attainment, occupational prestige, income, wealth, and health; racial and ethnic

identity; and current national debates regarding race/ethnicity, such as affirmative action and immigration. Throughout the course, we will address these issues in light of contemporary and classical sociological theories.

[SOC 1105 Introduction to Economic Sociology (SBA-AS)

Fall. 3 credits. Next offered 2010–2011. V. Nee.

For description, see department.]

[SOC 1150 Utopia in Theory and Practice (SBA-AS)

Spring. 3 credits. Next offered 2010–2011. D. Strang.

This course discusses the literary utopias of Moore, Morris, and Bellamy, and the dystopias of Huxley, Orwell, and Zamiatin. Also examines real social experiments.]

General Education Courses

SOC 2070 Problems in Contemporary Society (also DSOC 2070) (SBA-AS)

Fall. 4 credits. M. de Santos.

Examines contemporary social problems, with a focus on their sources in the organization of society. Modern societies are based on three fundamental types of institutions—social norms, hierarchies, and markets. Each is subject to distinctive types of failures resulting in problems that include poverty, prejudice and discrimination, intolerance and hate, alcohol and drug abuse, physical and mental illness, crime and delinquency, and urban problems. In analyzing these problems the course emphasizes the institutions through which they are created and perpetuated and the form of institutional change required to address them.

SOC 2090 Networks (also CS 2850, ECON/INFO 2040) (SBA-AS)

Spring. 4 credits. D. Easley and J. Kleinberg.

For description, see ECON 2040.

SOC 2100 What Is Science? (also STS 2011) (CA-AS)

Spring. 3 credits. K. Vogel.

For description, see STS 2011.

SOC 2150 Organizations: An Introduction (also DSOC 2150) (SBA-AS)

Fall. 4 credits. E. Hirsh.

Most of us spend the majority of our lives in the context of formal organizations; we attend schools, work for corporations, attend churches, join sororities or fraternities, and shop at our local coops. While the prominence of formal organizations in our daily lives is an indicator of their success and efficiency in modern society, we also know that organizations can be impersonal, unresponsive, and even corrupt. This course provides an introduction to the study of organizations in sociology. We will consider various types of organizations and how they operate, evolve, and change. A general theme throughout the course is the tension between complex organizations as efficient, productive institutions and the many unintended, and even perverse, consequences that organizations can have for those who interact with them. We also consider the role organizations play in both maintaining social stability and facilitating social change.

SOC 2160 Health and Society (SBA-AS)

Spring. 4 credits. E. York Cornwell.

This course will examine how social factors shape physical and mental health. First, we will review social scientific research on the relationship between health and status characteristics, neighborhood and residential context, employment, social relationships and support, religion, and health-related behaviors. We will devote particular attention to the development of research questions and methodological approaches in this work. Next, we will directly examine the relationship between health and social factors using data from a nationally representative survey. Course instruction will include statistical analysis of survey data and social scientific writing. Students will develop their own research exploring how social factors contribute to health.

SOC 2180 American Community and Society (SBA-AS)

Fall. 4 credits. M. Brashears.

This course will explore what we mean by community and society and present a number of different explanations for their development and operation. We will begin with general structural theories in sociology, which account for society through the basic demographic and mathematical features of human groups. We will then proceed to explore how structure interacts with culture and agency in specific contexts, including sex, gender, and economics. We will conclude by examining more cultural explanations for the development and change of community and society.

SOC 2202 Population Dynamics (also DSOC 2010) (CA-AS)

Spring. 3 credits. Staff.

For description, see DSOC 2010.

[SOC 2203 Work and Family in Comparative Perspective (SBA-AS)

Fall. 4 credits. Next offered 2010–2011. Staff.

For description, see department.]

SOC 2206 International Development (also DSOC 2050) (HA-AS)

Spring. 3 credits. Staff.

For description, see DSOC 2050.

SOC 2208 Social Inequality (also DSOC 2090) (SBA-AS)

Spring. 4 credits. K. Weeden.

Reviews contemporary approaches to understanding social inequality and the processes by which it comes to be seen as legitimate, natural, or desirable. We address questions of the following kind: What are the major forms of stratification in human history? Are inequality and poverty inevitable? How many social classes are there in advanced industrial societies? Is there a "ruling class?" Are lifestyles, attitudes, and personalities shaped fundamentally by class membership? Can individuals born into poverty readily escape their class origins and move upward in the class structure? Are social contacts and "luck" important forces in matching individuals to jobs and class positions? What types of social processes serve to maintain and alter racial, ethnic, and gender discrimination in labor markets? Is there an "underclass?" These and other questions are addressed in light of classical and contemporary theory and research.

[SOC 2210 Race, Class, and Gender Research in Practice (SBA-AS)

Spring. 4 credits. Next offered 2010–2011. K. Weeden.

This course introduces the underlying logic of social scientific research in context of contemporary debates about social inequality: e.g., educational testing and tracking, race-based affirmative action.]

[SOC 2220 Controversies about Inequality (also DSOC/ILROB/PAM 2220, GOVT 2225, PHIL 1950) (SBA-AS)]

Spring, 4 credits. Next offered 2010–2011. S. Morgan.

For description, contact department.]

[SOC 2250 Schooling and Society]

Spring, 4 credits. Next offered 2010–2011. L. Auf der Heide.

This course will use classical and contemporary theory, as well as recent research, to explore the institution of education.]

[SOC 2460 Drugs and Society (SBA-AS)]

Spring, 4 credits. D. Heckathorn.

The course focuses on drug use and abuse as a social rather than as a medical or psychopathological phenomenon. Specifically, the course deals with the history of drug use and regulatory attempts in the United States and around the world; the relationship between drug use and racism/class conflict; pharmacology and use patterns related to specific drugs; perspectives on the etiology of drug use/abuse; AIDS prevention and harm reduction interventions; drug-using subcultures; drug policy, drug legislation, and drug enforcement; and the promotion and condemnation of drug activities in the mass media.

[SOC 2480 Politics and Culture (also GOVT 3633) (HA-AS)]

Fall, 4 credits. M. Berezin.

Focuses on currently salient themes of nationalism, multiculturalism, and democracy. It explores such questions as who is a citizen; what is a nation; what is a political institution; and how do bonds of solidarity form in modern civil society. Readings are drawn principally from sociology and where applicable from political science and history. Journalist accounts, films, and web site research supplement readings.

[SOC 2510 Social Gerontology: Aging and the Life Course (also HD 2510)]

Spring, 3 credits. E. Wethington.

For description, see HD 2510.

[SOC 2560 Sociology of Law (SBA-AS)]

Fall, 4 credits. E. York Cornwell.

This course provides an introduction to the sociological perspective of law and legal institutions in modern society. A key question is the extent to which the law creates and maintains social order. And, what is its role in social change? We will review theoretical perspectives on the reciprocal relationship between law and society, and consider how this relationship is reflected in contemporary legal issues. Empirical research covered in this course will examine social interactions among actors within legal institutions (including the criminal courts, law school classrooms, and the jury room), and how individuals experience and utilize the law in everyday life.

[SOC 2650 Latinos in the United States (also DSOC 2650, LSP 2010) (SBA-AS)]

Spring, 3 credits; 4-credit option available. H. Velez.

Exploration and analysis of the Hispanic experience in the United States. Examines the sociohistorical background and economic, psychological, and political factors that converge to shape a Latino group identity in the United States. Perspectives are suggested and developed for understanding Hispanic migrations, the plight of Latinos in urban and rural areas, and the unique problems faced by the diverse Latino groups. Groups studied include Mexican Americans, Dominicans, Cubans, and Puerto Ricans.

[SOC 2710 Social and Political Context of American Education (also AMST/ EDUC 2710/5710, SOC 5710) (SBA-AS)]

Fall, 3- or 4-credit option. J. Sipple.

For description, see EDUC 2710.

Methods and Statistics Courses

[SOC 3010 Evaluating Statistical Evidence (also SOC 6010) (MQR)]

Fall, 4 credits. Prerequisite: Arts and Sciences students only. M. Brashears.

This course will introduce students to the theory and mathematics of statistical analysis. Many decisions made by ourselves and others around us are based on statistics, yet few people have a solid grip on the strengths and limitations of these techniques. This course will provide a firm foundation for statistical reasoning and logical inference using probability. While there is math in this course, it is not a math class per se, as a considerable amount of attention is devoted to interpreting statistics as well as calculating them.

[SOC 3040 Social Networks and Social Processes (SBA-AS)]

Fall, 4 credits. Next offered 2010–2011. D. Strang.

How do groups self-segregate? What leads fashions to rise and fall? How do rumors spread? How do communities form and police themselves on the Internet?

[SOC 3070 Society and Party Politics (also GOVT 3063) (SBA-AS)]

Spring, 4 credits. S. Van Morgan.

This course will focus on the role that society plays in the emergence and functioning of political parties. In addition to investigating different types of party systems, the societal roots of political parties, and the influence of institutions on electoral politics, the course will also examine contemporary debates, such as the relationship between culture and electoral behavior. Case studies will be drawn from a number of Western and non-Western settings.

Intermediate Courses

[SOC 3110 Group Solidarity (SBA-AS)]

Spring, 4 credits. M. Macy.

What is the most important group that you belong to? What makes it important? What holds the group together, and how might it fall apart? How does the group recruit new members? Select leaders? Make and enforce rules? Do some members end up doing most of the work while others get a free ride? This course explore these questions from an interdisciplinary perspective, drawing on sociobiology, economics, and social psychology, as it applies alternative theories of group solidarity to a series of case studies, such as urban gangs, spiritual communes, the civil rights movement, pro-life activists, athletic teams, work groups, and college fraternities.

[SOC 3130 Sociology of Medicine (also STS 3111) (SBA-AS)]

Fall, 4 credits. C. Leuenberger.

For description, see STS 3111.

[SOC 3190 Contemporary Sociological Theory (SBA-AS)]

Spring, 4 credits. Next offered 2010–2011. D. Strang.

Introduction to main ideas and lines of research in contemporary sociology, from the emergence of the field in the American academy to the present.]

[SOC 3240 Environment and Society (also DSOC 3240, STS 3241) (SBA-AS)]

Spring, 3 credits. Staff.

For description, see DSOC 3240.

[SOC 3270 Toleration and Fundamentalism (SBA-AS)]

Spring. Next offered 2011–2012.

M. Berezin.

For description, contact department.]

[SOC 3360 Evolving Families: Challenges to Public Policy (also PAM 3360) (SBA-AS)]

Spring, 3 credits. S. Sassler.

For description, see PAM 3360.

[SOC 3370 Race and Public Policy (also PAM 3370) (SBA-AS)]

Fall, 3 credits. S. Sassler.

For description, see PAM 3370.

[SOC 3410 Modern European Society and Politics (also GOVT 3413) (SBA-AS)]

Fall, 4 credits. S. Van Morgan.

For description, see GOVT 3413.

[SOC 3500 Sociology of China's Transition to Capitalism @ (SBA-AS)]

Spring, 3 credits. V. Nee.

China's rise as a major global economic power is examined in this course from the sociological perspective. The political elite initiated economic reform in 1978 to revive its state-owned economy; yet from the reform emerged a new capitalist economy. The course examines the social origin of entrepreneurs, the nature of the firms they founded, their use of social networks in markets, and the social construction of the economic institutions of capitalism. The course studies the social and economic transformations caused by the rise of capitalism, from the "floating population" of migrant rural labor, new urban consumer society, to the social costs of degradation of the natural environment. Lastly, the course compares capitalism in China and in the West, pointing to similarities and differences in the varieties of capitalist economies and how they experience global economic crisis.

[SOC 3570 Schooling, Racial Inequality, and Public Policy in America (SBA-AS)]

Spring, 4 credits. S. Morgan.

After examining alternative explanations for why individuals obtain different amounts and types of educational training, the course focuses on how an individual's family background and race affect his or her trajectory through the educational system. The course covers the specific challenges that have confronted urban schooling in America since the 1960s, including the classic literature on the effects of school and community resources on student achievement and as well as the development and later evaluation of school desegregation policies. Also considers case studies of current policy debates in the United States, such as housing segregation and school

resegregation, voucher programs for school choice, and the motivation for and consequences of the establishment of state-mandated testing requirements. Throughout the course, emphasis is placed upon the alternative modes of inquiry and writing which opposing scholars, policymakers, and journalists use to address these contentious topics.

SOC 3620 Employment Inequality and the Law (SBA-AS)

Fall. 4 credits. E. Hirsh.

The work people do is important for all aspects of their lives, including their earnings, their social status, where they live, and opportunities for their children. This course examines gender, race, and ethnic inequality in the context of employment. While traditional explanations of employment inequality focus on how differences in workers' skills and qualifications lead to disparities in income, status, and other work-related rewards, this course emphasizes how organizational and legal structures—such as hiring practices, workplace policies, and the law—produce variation in inequality. The course concludes with a discussion of how employment law can intervene in the perpetuation of sex, race, and ethnic inequality.

[SOC 3670 Social Inequalities in Physical and Mental Health (also HD 3570)

Fall. 3 credits. Next offered 2010–2011.

E. Wethington.

For description, see HD 3570.]

SOC 3710 Comparative Social Inequalities (also DSOC 3700) (SBA-AS)

Fall and spring. 3 credits. Fall, R. Mize; spring, T. Hirsch.

For description, see DSOC 3700.

SOC 3750 Classical Theory # (SBA-AS)

Spring. 3 credits. Staff.

Introduction to the classics in sociology, primarily works by Karl Marx, Max Weber, Emile Durkheim, and Georg Simmel. Students also study the works of Alexis de Tocqueville, Montesquieu, and Joseph Schumpeter. Special emphasis is put on the concepts, ideas, and modes of explanation that characterize the classics. Students also look at these writers' empirical material, and what may be termed the social construction of the classics. Course requirements include active class participation and three tests in class.

SOC 3950 The Nature of Capitalism: Markets, Firms, and People (SBA-AS)

Spring. 4 credits. R. Swedberg.

This course looks at the modern economy from a sociological perspective in which the role of capitalism is emphasized. It begins with a presentation and discussion of the key theoreticians of capitalism, such as Marx, Weber, Schumpeter, and Polanyi. It then continues with the various institutions that make up or are part of the capitalist system, such as the firm, the market, the state, and the legal system. Cultural aspects of capitalism as well as normative argument, for and against capitalism, will also be discussed. Course requirements include active class participation and three tests in class.

SOC 3970 Israeli–Palestinian Conflict (also GOVT 3977, HIST 3970, JWST/NES 3697) @ (HA-AS)

Spring. 4 credits. R. Brann.

For description, see NES 3697.

Advanced Courses

The following courses are intended for advanced undergraduates with substantial preparation, as well as for graduate students in sociology and related disciplines. The normal prerequisite for all 4000-level courses is one introductory course plus 3010 (or an equivalent statistics course). Students who are not sure whether their background is sufficient for a particular course should consult the professor.

SOC 4080 Qualitative Methods (also SOC 5080) (SBA-AS)

Spring. 4 credits. M. Berezin.

This course aims to acquaint students with the practice of non-quantitative research methods. It does not offer a laundry list of techniques, rather it asks students to think about how particular methods are more or less suited to the answering of particular types of research questions. The course is divided into four parts: (1) a general discussion of theory, methods and evidence in social science; (2) a series of readings and exercises on particular methods; (3) an analysis of full-length works to see how they were put together; (4) discussion of student projects.

SOC 4100 Health and Survival Inequalities (also DSOC/FGSS 4100) (SBA-AS)

Fall. 4 credits. A. Basu.

For description, see DSOC 4100.

SOC 4210 Theories of Reproduction (also DSOC/FGSS 4210) (SBA-AS)

Spring. 4 credits. A. Basu.

For description, see DSOC 4210.

[SOC 4250 Artificial Societies (also SOC 5270) (SBA-AS)

Spring. 4 credits. Next offered 2010–2011.

M. Macy.

This seminar is an introduction to computer simulation. The course surveys the history of social simulation and introduces students to complexity theory, game theory.]

SOC 4340 Online Social and Information Networks

Fall. 4 credits. M. Macy.

This research seminar will introduce students to the methods of network analysis and online data collection, as well as theoretical models of online social interaction, including diffusion, homophily, and social influence. Students will design, develop, and carry out a semester-long research project using these methods and models.

[SOC 4420 The Sociology of Science (also BSOC/STS 4421) (SBA-AS)

Spring. 4 credits. Next offered 2010–2011.

T. Pinch.

For description, see STS 4421.]

[SOC 4460 Economic Sociology (also SOC 6460) (SBA-AS)

Fall. 4 credits. Next offered 2011–2012.

V. Nee.

This course introduces the field of economic sociology and covers major topics addressed by sociologists studying the intersection of economy and society.]

SOC 4510 Special Topics in Social Psychology: Social Structure and Personality

Spring. 4 credits. L. Auf der Heide.

As individuals living in societies, we are both impacted by our positions within society, and have the ability, through our membership in

groups, to impact society. The study of social structure and personality examines this reciprocal relationship between individuals and their societies. This course is structured in three units. In the first unit of the course students will examine how sociology views the processes by which individuals come to have a self, how we think about ourselves, and how we feel about ourselves. The second unit will expose students to literature that documents how an individual's location along various dimensions in the social structure (for example, race and ethnicity, gender, age, or social class) impacts familial, work, and educational outcomes. And during the third unit students will investigate the impact of changing cultural values and social structures on our perceptions of the world and our sense of who we are as individuals. Throughout the course, students will be actively engaging with these topics using a positivist, scientific lens; students will be encouraged to approach topics critically, apply concepts to real-life experiences, and write a culminating research paper on a topic of particular interest to the student.

SOC 4530 Knowledge and Society (also STS 4531) (CA-AU)

Spring. 4 credits. C. Leuenberger.

For description, see STS 4531.

SOC 4570 Health and Social Behavior (also HD 4570)

Fall. 3 credits. Prerequisites: HD 2500, SOC 1101, DSOC 1101, or SOC 2500 and a course in statistics. Letter grades only.

E. Wethington.

For description, see HD 4570.

[SOC 4780 The Family and Society in Africa (also ASRC 4606) @ (SBA-AS)

Fall, summer. 4 credits. Next offered 2010–2011. N. Assié-Lumumba.]

SOC 4910 Independent Study

Fall or spring. 1–4 credits. For undergraduates who wish to obtain research experience or do extensive reading on a special topic. Prerequisite: acceptable prospectus and agreement of a faculty member to serve as supervisor for project throughout semester. Graduate students should enroll in 8910–8920.

[SOC 4920 Economic Sociology of Entrepreneurship (SBA-AS)

Fall. 4 credits. Next offered 2010–2011.

V. Nee.

For description, see department.]

SOC 4950 Honors Research

Fall or spring. 4 credits. Prerequisite: sociology seniors; permission of instructor.

SOC 4960 Honors Thesis: Senior Year

Fall or spring. 4 credits. Prerequisite: SOC 4950.

Graduate Core Courses

These courses are primarily for graduate students in sociology but may be taken by other graduate students with permission of the instructor.

[SOC 5010 Basic Problems in Sociology I

Fall. 4 credits. Next offered 2010–2011.

V. Nee.

Analysis of theory shaping current sociological research. Examination of several central problems in sociological inquiry provides an occasion for understanding tensions and continuities between classical and

contemporary approaches, for indicating the prospects for unifying microsociological and macrosociological orientations, and for developing a critical appreciation of efforts to integrate theory and research.]

SOC 5020 Basic Problems in Sociology II

Fall. 4 credits. D. Heckathorn.
Continuation of SOC 5010. Emphasis is on the logical analysis of theoretical perspectives, theories, and theoretical research programs shaping current sociological research. The course includes an introduction to basic concepts used in the logical analysis of theories and examines their application to specific theories and theoretical research programs. Theoretical perspectives include functionalism, social exchange, and interactionism.

SOC 5060 Research Methods II

Spring. 4 credits. E. Hirsh.
This course provides an in-depth examination of linear modeling. We begin with the basics of linear regression, including estimation, statistical inference, and model assumptions. We then review several tools for diagnosing violations of statistical assumptions and what to do when things go wrong, including dealing with outliers, missing data, omitted variables, and weights. Finally, we will explore extensions of the linear regression model, including models for categorical outcomes and hierarchical linear modeling. While statistical modeling is the focus of the course, we proceed with the assumption that models are only as good as the theoretical and substantive knowledge behind them. Thus in covering the technical material, we will spend considerable time discussing the link between substantive knowledge and statistical practice.

Graduate Seminars

These seminars are primarily for graduate students but may be taken by qualified advanced undergraduates who have permission of the instructor. The seminars offered in each semester are determined in part by the interests of students, but it is unlikely that any seminar will be offered more frequently than every other year. The list below indicates seminars that are likely to be offered, but others may be added and some may be deleted. Students should check with the department before each semester.

SOC 5080 Qualitative Methods (also SOC 4080)

Spring. 4 credits. M. Berezin.
For description, see SOC 4080.

[SOC 5100 Seminar on Comparative Societal Analysis

Spring. 3 credits. Prerequisite: advanced graduate students throughout social sciences; permission of instructor. Next offered 2010–2011. M. Berezin.
For description, see department.]

SOC 5180 Social Inequality

Fall. 4 credits. S. Morgan.
This course serves as an introduction to contemporary theories, debates, and models regarding the structure of social classes, the determinants of social mobility, the sources and causes of racial, ethnic, and gender-based inequality, and the putative rise of postmodern forms of stratification. The twofold objective is to both review contemporary theorizing and to identify areas in which new theories,

hypotheses, and research agendas might be fruitfully developed.

[SOC 5190 Workshop on Social Inequality

Spring. 4 credits. Prerequisite: SOC 5180; sociology Ph.D. students, or permission of instructor. Next offered 2010–2011.
K. Weeden.

A forum in which students and others can present, discuss, and receive instant feedback on their inequality-related research. Its goal is to help students advance their research.]

[SOC 5270 Artificial Societies (also SOC 4250)

Spring. 4 credits. Next offered 2010–2011.
M. Macy.
For description, see SOC 4250.]

[SOC 5280 Conflict and the Nation-State

Fall. 4 credits. Next offered 2010–2011.
D. Strang.

The nation–state developed out of conflict, through military competition within Europe and the rise of and response to colonial empires in the Americas, Asia, and Africa.]

[SOC 5400 Organizational Research

Fall. 4 credits. Next offered 2011–2012.
D. Strang.

Seminar focusing on contemporary sociological research on organizations. It centers theoretically on the interplay of institutional, ecological, and choice-theoretic accounts of organizational structure and action.]

SOC 5710 Social and Political Context of American Education (also AMST/ EDUC 2710/5710, SOC 2710)

Fall. 3- or 4-credit option. J. Sipple.
For description, see EDUC 2710.

SOC 5800 Identity and Interest in Collective Action

Fall. 4 credits. Offered every other year.
M. Macy.

This research seminar examines the problem of collective action from alternative theoretical perspectives: one centered on shared interests, the other on common identities. The former claims that groups are held together because the members are interdependent and thus benefit from mutual trust and cooperation in a common endeavor. Identity theorists contend that trust and cooperation may also depend on affective and normative ties among participants who share a salient demarcation (including a “shared fate”). We will explore this debate, and its possible resolution, through an examination of formal theoretical studies (including game theoretic, evolutionary, and agent-based models) as well as empirical research using experimentation and comparative case analysis. We will also examine research on informal social control (including reciprocity and reputation systems), social networks, and mobilizing strategies as mechanisms for reconciling the tension between individual self-interest and collective obligations. The primary goal is to identify, formulate, and launch promising research projects, and to that end, seminar members will be expected to critically engage the literature each week and to write a final paper that advances original research (as a detailed prospectus or, where practical, as a publishable article).

SOC 5910 Special Seminars in Sociology

Fall and spring. 2–4 credits. Staff.

These graduate seminars are offered irregularly. Topics, credit, and instructors vary from semester to semester. Students should look at the Sociology Department bulletin board at the beginning of each semester for current offerings.

SOC 6010 Evaluating Statistical Evidence (also SOC 3010)

Fall. 4 credits. M. Brashears.
For description, see SOC 3010.

[SOC 6050 Political Sociology

Fall. 3 credits. Next offered 2011–2012.
S. Soule.

For description, see department.]

SOC 6060–6070 Sociology Colloquium

Fall and spring. 0 credits. Requirement for sociology graduate students. Staff.

A series of talks representative of current research interests in sociology, given by distinguished visitors and faculty members.

SOC 6080 Proseminar in Sociology

Fall. 1 credit. Prerequisite: first-semester sociology graduate students. Staff.

Discussion of the current state of sociology and of the research interests of members of the graduate field; taught by all members of the field.

[SOC 6090 Special Topics in Methodology

Spring. 2 credits. Next offered 2010–2011.
S. Morgan.

For description, see department.]

[SOC 6100 The Sociological Classics

Spring. 3 credits. Next offered 2010–2011.
R. Swedberg.

The purpose of the course is to make the student familiar with the concepts, ideas and ways of reasoning that characterize the major works of the classics.]

SOC 6110 Introduction to Network Theory and Methods

Spring. 4 credits. Intended as an introduction for students who have not had exposure to network analysis previously or who are interested in the historical role of networks in sociology.
M. Brashears.

Social Network Analysis (SNA), or the mathematical analysis of webs of relationships, is a thriving part of sociology and an active research area for numerous other disciplines. This course is intended to introduce students to the basics of SNA and help them apply it to a variety of research questions. We will discuss the theoretical underpinnings of the area, basic concepts used in SNA analyses, and finally methods for describing and interpreting network data. At the completion of this course students should have a basic understanding of social networks and be able to carry out a variety analyses on their own.

SOC 6260 Controversies in Economic Sociology

Fall. 4 credits. R. Swedberg.

This course is open to seniors and graduate students. It takes the form of a seminar in which each meeting will be devoted to a discussion of a controversial and/or difficult issue in economic sociology. Issues that will be discussed for-and-against include the notion of embeddedness, the market, bonuses, and *Homo economicus*. For these classes, there will be two readings for each class: one for and one against. Each student will have to argue once “for” and once “against” on some

issue. A few topics will also be included where there exist substantially different interpretations rather than just “for-and-against” opinions. The main topic here is the current financial crisis, but we will also be discussing different programs in economic sociology besides embeddedness, especially those of Max Weber and Pierre Bourdieu.

SOC 6300 Cultural Sociology

Spring, 4 credits. M. Berezin.

Cultural sociology is a flourishing sub-field within sociology that incorporates a wide range of substantive areas (art, inequality, family, politics) and uses a wide range of methods from the ethnographic to the textual. This course proposes to explore some of the leading works and ideas in that field and to analyze how culture operates in social life. It begins by analyzing the different meanings that sociologists have ascribed to culture. We begin by reading classics like Durkheim's *Elementary Forms of Religious Life* then move on to contemporary theorists such as Geertz, Bourdieu, Alexander and Swidler. We then read a series of empirically grounded case studies that make culture the basis of the analysis (i.e., Lamont, *Money Manners and Morals*). We will also analyze certain cultural objects such as films, art, etc. to put into practice some of the ideas from the readings. There is no course such as this taught by a practicing cultural sociologist in the university.

SOC 6320 Inside Technology: The Social Construction of Technology (also STS 6321)

Fall, 4 credits. Staff.

For description, see STS 6321.

[SOC 6350 Network Sampling and Network Structure

Fall, 4 credits. Next offered 2010–2011.

D. Heckathorn.

Network sampling methods provide means for drawing probability samples of hidden and hard-to-reach populations. These are difficult to sample using standard survey research methods.]

[SOC 6460 Economic Sociology (also SOC 4460)

Fall, 4 credits. Next offered 2011–2012.

V. Nee.

For description see SOC 4460.]

[SOC 6500 Research Methods in Social Movements

Spring, 4 credits. Next offered 2011–2012.

S. Soule.

For description, see department.]

[SOC 6600 States and Social Movements (also GOVT 6603)

Spring, 4 credits. Next offered 2010–2011.

S. Tarrow.

For description, see GOVT 6603.]

SOC 6660 Event History Analysis

Spring, 4 credits. D. Strang.

Event history analysis (also known as hazard or survival analysis) is a family of methods for the study of discrete outcomes over time. Typical sociological examples are demographic events (births, deaths) and forms of institutional or structural change (marriage, job entry, revolution). This class introduces main concepts, models, and measurement issues in event history analysis, and provides students with an opportunity to gain practical familiarity with the technique.

SOC 6860 War, States, and Human Rights (also GOVT 6867)

Fall, 4 credits. S. Tarrow.

For description, see GOVT 6867.

SOC 6910 Independent Study

Fall or spring. 2–4 credits. Prerequisite: graduate status and permission of faculty member willing to supervise project. Staff.

For graduates who wish to obtain research experience or to do extensive reading on a special topic. Permission to enroll for independent study is granted only to students who present an acceptable prospectus and secure the agreement of a faculty member to serve as supervisor for the project throughout the semester.

[SOC 7780 Solidarity in Groups (also ILOB 7780)

Fall, 3 credits. Next offered 2010–2011.

E. Lawler.

For description, see ILOB 7780.]

SOC 8910–8920 Graduate Research

8910, fall; 8920, spring. Variable to 4 credits each semester. Prerequisite: graduate standing and permission of faculty member willing to supervise project.

SOC 8950–8960 Thesis Research

8950, fall; 8960, spring. Variable to 6 credits each semester. Prerequisite: permission of thesis supervisor.

SOUTH ASIA PROGRAM

D. Gold, director; A. Banerjee, A. Basu, K. Basu, A. Blackburn, B. Bledsoe, D. Bor, D. Boucher, I. Dadi, L. Derry, S. Feldman, D. Ghosh, D. Gurak, M. Hatch, B. Herath, R. Herring, D. Holmberg, S. Kalantry, R. Kanbur, M. Katzenstein, N. Kudva, S. Kuruvilla, B. Lust, B. MacDougall, M. Majumdar, K. March, L. McCrear, K. McGowan, S. Mohanty, S. Mukherjee, V. Munasinghe, A. Nussbaum, S. Oja, P. Olpadwala, B. Perlus, E. Prasad, K. V. Raman, A. Ruppel, N. Sethi, S. Singh, N. Swanson, E. Tagliacozzo, S. Toorawa, R. Travers, M. Walter, M. Weiss, A. Willford. Emeritus: R. Colle, J. Gair, K. A. R. Kennedy, M. Latham, D. Sisler, E. Thorbecke, N. Uphoff.

The South Asia Program coordinates research, teaching, and special campus events relating to Afghanistan, Bangladesh, India, Pakistan, Nepal, and Sri Lanka. The program faculty include members from a variety of disciplines, including agricultural economics, agricultural engineering, anthropology, architecture, art, city and regional planning, comparative religion, development sociology, ecology and systematics, economics, English, geology, government, history, history of art, human ecology, industrial and labor relations, international agriculture, linguistics, and literature. Undergraduates with a special interest in the region may major in Asian Studies with a South Asian concentration, or complete a South Asia minor with any other major. Graduate students may pursue the M.A. degree in Asian Studies with a concentration in South Asia.

Languages offered are Bengali, Hindi, Nepali, Sinhala, Sanskrit, Tamil, and Urdu. Foreign Language and Area Studies scholarships are available to graduate students who are U.S. citizens or permanent residents. Scholarships are also available for undergraduates studying

intensive language in the summer. Cornell is a member of the American Institutes of Bangladesh, Indian, Pakistan, and Sri Lankan studies. For details on the major, see the Department of Asian Studies listing in this volume. For courses available in South Asian studies, or for further information on research opportunities, direct questions to the South Asia Program Office, 170 Uris Hall, 255–8493. www.einaudi.cornell.edu/SouthAsia.

SOUTHEAST ASIA PROGRAM

T. Chaloeintiarana, director (180 Uris Hall); I. Azis, W. Bailey, A. Blackburn, A. Cohn, M. Fiskesjo, M. Hatch, S. Kuruvilla, F. Logevall, T. Loos, K. McGowan, L. Paterson, T. Pepinsky, E. Tagliacozzo, K. Taylor, M. Welker, A. Willford, L. Williams, Emeritus: B. Anderson, R. Barker, S. O'Connor, E. Thorbecke, J. Wolff. Lecturers: N. Jagacinski, J. Pandin, H. Phan, T. Savella, T. Tranviet, S. Tun

Southeast Asia studies at Cornell is within the framework of the Department of Asian Studies and affiliates with the Einaudi Center for International Studies. Nineteen core faculty members in the colleges of Arts and Sciences, Business and the Johnson Graduate School of Management, the School of Industrial and Labor Relations, and Agriculture and Life Sciences participate in an interdisciplinary program of teaching and research on the history, culture, and societies of the region stretching from Burma through the Philippines. Courses are offered in such fields as anthropology, Asian studies, economics, finance, government, history, history of art, labor relations, linguistics, music, and development sociology. Instruction is also offered in a wide variety of Southeast Asian languages: Burmese, Cambodian (Khmer), Indonesian, Tagalog, Thai, and Vietnamese. In addition, faculty from other disciplines provide area instruction on Southeast Asia. The formal program of study is enriched by a diverse range of extracurricular activities, including an informal weekly brown bag seminar, art exhibits at the Johnson Museum, and concerts of the Gamelan Ensemble. The George McT. Kahin Center for Advanced Research on Southeast Asia is the site for public lectures as well as publication and outreach activities related to this program. The John M. Echols Collection on Southeast Asia, in Kroch Library, is the most comprehensive collection on Southeast Asia in the United States.

Undergraduates may major in Asian Studies with a focus on Southeast Asia and its languages, or they may elect to minor in Southeast Asian studies with any other major by completing 18 credits of course work. Graduate students may work toward an M.A. degree in Southeast Asian studies or pursue a Master of Professional Studies in another school with a concentration in Southeast Asian studies. Ph.D. students specializing in Southeast Asia receive a doctorate in a discipline such as history, history of art, anthropology, government, linguistics, music, economics, or city and regional planning. Academic Year and Summer Foreign Language and Area Studies scholarships are available to graduate students who are U.S. citizens or permanent residents.

For courses available in Southeast Asian studies and details on the major, see the Department of Asian Studies listing in this volume. Additional information is available at

www.einaudi.cornell.edu/southeastasia.
Inquiries for further information should be directed to the program office, 180 Uris Hall, 255-2378 or SEAP@cornell.edu.

SPANISH

See "Department of Romance Studies."

STATISTICAL SCIENCE DEPARTMENT

The university-wide Department of Statistical Science coordinates undergraduate and graduate study in statistics and probability. A list of suitable courses can be found in the CIS section of this catalog.

SWAHILI

See "Africana Studies and Research Center."

SWEDISH

See "Department of German Studies."

TAGALOG

See "Department of Asian Studies."

THAI

See "Department of Asian Studies."

THEATRE, FILM, AND DANCE

Faculty: A. Villarejo, chair; R. Archer, S. Bernstein, S. Brookhouse, J. Chu (on leave spring 2010), W. Cross, M. Dreyer, D. Feldshuh, A. Fogelsanger (director of undergraduate studies in dance), D. Fredericksen (director of undergraduate studies in film), J. E. Gainor (on leave 2009-2010), K. Goetz, S. Haenni (on leave fall 2009), D. Hall, E. Intemann, J. Kovar (on leave fall 2009), B. Levitt, P. Lillard, R. MacPike, B. Milles, J. Morgenroth (on leave fall 2009), L. Patti, M. Rivchin, N. Salvato (on leave fall 2009), J. Self, B. Suber, A. Van Dyke (director of undergraduate studies in theatre), S. Warner (on leave spring 2010), H. Yan (director of graduate studies).

Teaching staff: A. Bernstein, L. Boquist, S. Kelly, B. Komala, T. Ostrander, K. Phoenix, F. Sellers, J. Tindall.

Through its courses and production laboratories, the department provides students with a wide range of opportunities in theatre, film, and dance. It also offers bachelor of arts degrees in each of those areas. These majors educate students in accordance with the general liberal arts ethic of the college. The department invites and encourages academic and studio participation by students from all disciplines.

Theatre Arts Major

R. Archer, S. Bernstein, S. Brookhouse, W. Cross, D. Feldshuh, J. E. Gainor (on leave 2009-2010), K. Goetz, D. Hall, E. Intemann, B. Levitt, P. Lillard, R. MacPike, B. Milles, L. Patti, N. Salvato (on leave fall 2009), A. Van Dyke (director of undergraduate studies), S. Warner (on leave spring 2010), H. Yan (director of graduate studies).

The theatre major offers studies in the history of theatre, dramatic theory and criticism, playwriting, acting, directing, design/technology, and stage management. Students interested in the theatre arts major should consult with Alison Van Dyke (director of undergraduate studies).

Theatre major requirements Credits

1. **THETR 2400** and **2410** 8
THETR 2500 Introduction to Theatre Design and Technology 4
THETR 2800 Introduction to Acting 3
2. Four laboratory courses distributed as follows:
THETR 1510 Production Lab I 1-3
THETR 1530, 2530, or **3530** Stage Management Lab I, II, or III 1-4
THETR 1550 Rehearsal and Performance or **THETR 1510** in a different area 1-3
THETR 2510 or **3510** Production Lab II or III 1-3
3. Four courses in the area of **theatre studies** (see "Theatre Studies" section of theatre courses) chosen in the following manner:
one course must be at 3000 level
one course must be at 4000 level
two additional courses at the 3000 or above level
one of the four courses must be pre-20th century.
4. Three courses (at least 9 credits) in other theatre courses chosen in consultation with the faculty advisor. Course taken to qualify for admission to the Advanced Undergraduate Theatre Program (described below) may also be used to fulfill this requirement.
5. Courses in which a student receives a grade below C cannot be used to fulfill the requirements for a Theatre major.

Honors

The theatre honors program is for majors who have demonstrated exceptional ability in the major and who seek an opportunity to explore branches of their subject not represented in the regular curriculum or to gain experience in original research. To be part of the honors program the student must maintain a GPA of 3.5 in classes for the theatre major and an average of 3.0 in all courses. Students must consult with their advisors in the spring of their junior year to enroll in the honors programs.

The Advanced Undergraduate Theatre Program

The department offers advanced study in directing, playwriting, design/technology, and stage management to students who qualify on

the basis of outstanding achievement in course work. Admission to the AUPP is by invitation of the area faculty supervisor and the completion of a recommended "track" of courses or equivalent experience. (For recommended courses of study see listing of courses at end of departmental listings.) Approval process includes a portfolio review and/or interview. The program provides students with intensive study in theatre as well as the opportunity to collaborate with professional faculty and guest artists.

Minor in Theatre

The Theatre Minor is divided into three tracks in order to allow students to focus in the area that interests them most within the theatre discipline. The Theatre Studies Track is the most generalized, providing an introductory exposure to performance and production studies, with the remaining courses taken in theatre history, theory and criticism. The Theatre Performance Track is tailored to students who wish to focus their studies in the areas of acting and directing. And the Theatre Production Track is tailored to those students interested in exploring more specifically theatre design and technology.

Requirements:

Theatre Studies Track

1. THETR 2400 or 2410: Introduction to World Theatre I or II
2. THETR 2800: Introduction to Acting
3. one production studio course
4. one theatre studies course at any level
5. one 3000-level theatre studies course
6. 1-3 credits of THETR 1510, 2510, or 3510: Production Laboratory I, II, or III

Theatre Performance Track

1. THETR 2400 or 2410: Introduction to World Theatre I or II
2. THETR 2800: Introduction to Acting
3. three acting or directing courses
4. 1-3 credits of THETR 1510, 2510, or 3510: Production Laboratory I, II, or III

Theatre Production Track

1. THETR 2400 or 2410: Introduction to World Theatre I or II
2. THETR 2500: Fundamentals of Theatre Design and Technology
3. any three production studio courses
4. 1-3 credits of THETR 1510, 2510, or 3510: Production Laboratory I, II, or III

Courses in which a student receives a grade below a C cannot be used to fulfill the requirements for the Theatre Minor.

Information on current courses that can be used to satisfy requirements of the above minors can be obtained at 223 Schwartz Center, or online at www.arts.cornell.edu/theatrearts/academics/theatre/TheatreMinorRequirements.asp.

Independent Study, Internships, and Honors

THETR 3000 Independent Study

Fall, spring, or summer. 1–4 credits.
Independent study in theatre allows students the opportunity to pursue special interests not treated in regularly scheduled courses. A faculty member, who becomes the student's instructor for the course, must approve the student's program of study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study, which is available in 223 Schwartz Center.

THETR 4850 Undergraduate Internship

Fall, spring, or summer. 1–3 credits.
Prerequisite: majors or concentrators in the department.
Students are responsible for arranging their own internships in consultation with the faculty in their area of choice *before* preregistration for the semester in which the internship is planned to take place. To receive credit for this course, the internship must be unpaid. Students must follow the rules and procedures stated in the departmental internship form.

THETR 4950 Honors Research Tutorial

Fall. 4 credits. Prerequisite: honors students in theatre.
First of a two-semester sequence (the second is THETR 4960) for seniors engaged in an honors project.

THETR 4960 Honors Research Tutorial

Spring. 4 credits. Prerequisite: honors students in theatre.
Second of a two-semester sequence (the first is THETR 4950) for students engaged in an honors project.

THETR 7210 Independent Study for Graduate Students in Theatre

Fall and spring. 1–4 credits. Staff.
Independent study in theatre allows graduate students the opportunity to pursue special interests not treated in regularly scheduled courses. A faculty member, who becomes the student's instructor for the course, must approve the student's program of study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study, which is available in 223 Schwartz Center.

First-Year Writing Seminars

Consult the John S. Knight Institute brochure for times, instructors, and descriptions.

Theatre Studies

[THETR 2150 The American Musical (also AMST 2105, ENGL 2150, MUSIC 2250) (LA-AS)]

Fall. 3 credits. Next offered 2010–2011. N. Salvato.
The musical is a distinct and significant form of American performance. This course will consider the origins, development, and internationalization of the American musical and will emphasize how political, social, and economic factors shape the production of important American musicals.]

[THETR 2230 The Comic Theater (also CLASS 2651, COML 2230) # (LA-AS)]

Spring. 3 credits. Next offered 2010–2011. J. Rusten.
For description, see CLASS 2651.]

[THETR 2360 Public Voice and Civic Gesture (also DANCE 2450, VISST 2360)]

Fall. 1 credit. Next offered 2010–2011. B. Suber.
For description, see DANCE 2450.]

THETR 2400 Introduction to World Theatre I—Antiquity through 1500 # (LA-AS)

Fall. 4 credits. S. Warner.
A survey of practices, literatures, and themes of global performance in Africa, America, Asia, and Europe from antiquity through 1500. Examines case studies from ancient Egypt, Greece, Rome, the Near East, India, China, Japan, and England, continuing up to the age of European imperialism. Looks at issues of masking and identity, storytelling and ritual, stage and society, tradition and modernity. Lectures are combined with periodic student projects.

THETR 2410 Introduction to World Theatre II—NeoClassical to the Present # (LA-AS)

Spring. 4 credits. N. Salvato.
A survey of practices, literatures, and themes of global performance from around 1600 to the present. Examines the development of European and Asian vernacular and national theatrical traditions; recent ethnic and popular performance traditions of Europe, Asia, Africa, and meso-America; recurring issues of realism and theatricality; avant-garde innovations; colonial expansion and marginalization; intercultural and transnational exchanges. Lectures are combined with periodic student projects.

THETR 2605 Theater, Sport, and Spectacle: Performance and Competition in Greece and Rome (also CLASS 2605) # (CA-AS)

Fall. 3 credits. J. Rusten.
For description, see CLASS 2605.

THETR 2730 Opera (also MUSIC 2241) # (LA-AS)

Spring. 3 credits. R. Harris-Warrick.
For description, see MUSIC 2241.

THETR 2770 Shakespeare (also ENGL 2270) # (LA-AS)

Fall. 4 credits. B. Correll.
For description, see ENGL 2270.

[THETR 2780 Desire (also COML/ENGL/FGSS 2760) (LA-AS)]

Spring. 4 credits. Next offered 2011–2012. E. Hanson.]

[THETR 3130 Special Topics in Drama and Performance (also ENGL 3760, FGSS 3130)]

Fall. 4 credits. Next offered 2010–2011. S. Warner.
An intensive study of a particular dramatist, period, form or problem in drama and/or performance. Topics, prerequisites and formats will vary from year to year.]

THETR 3190 Music, Dance, and Light (also DANCE 3590, VISST 3519) (LA-AS)

Spring. 3 credits. Attendance at dance concerts and music concerts required. A. Fogelsanger and E. Intemann.
For description, see DANCE 3590.

THETR 3260 Queer Performance (also FGSS 3250) (LA-AS)

Fall. 3 credits. Limited to 15 students. S. Warner.
What constitutes queer performance? What is queer's relationship to lesbian and gay? What is performance's relationship to theatre? Is sexuality all we mean by queer?

[THETR 3350 Modern Western Drama, Modern Western Theatre: Theory and Practice (also ENGL 3350, VISST 3735) (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. N. Salvato.
This course investigates drama and the cultural contexts of its performance from the mid-19th century to the mid-20th century in Europe and the United States.]

[THETR 3360 American Drama and Theatre (also AMST 3360) (LA-AS)]

Spring. 4 credits. Prerequisite: permission of instructor. Limited to 25 students. Next offered 2010–2011. N. Salvato.
This course explores major American playwrights from 1900 to 1960, introducing students to American theater as a significant part of modern American cultural history.]

[THETR 3370 Contemporary American Theatre (also AMST/ENGL 3370) (LA-AS)]

Spring. 3 credits. Limited to 15 students. Next offered 2010–2011. S. Warner.
In this course we will examine major trends in American drama from 1960 to the present.]

THETR 3450 The Tragic Theatre (also CLASS 3645, COML 3440) # (LA-AS)

Spring. 4 credits. Limited to 40 students. F. Ahl.
For description, see CLASS 3645.

[THETR 3720 Medieval and Renaissance Drama (also ENGL 3720) # (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. M. Raskolnikov.
For description, see ENGL 3720.]

[THETR 4030 Ritual, Play, Spectacle, Act: Performing Culture (also THETR 6030) (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. S. Warner.]

THETR 4070 Transnational Imagination: A Seminar on Modern Theatre and Cultural History (also THETR 6070) (LA-AS)

Fall. 4 credits. H. Yan.
This seminar examines a selection of works by major dramatic artists and critical theorists central to the making of modern theatre and cultural history. Materials are organized with a focus on variable aesthetics of visibility and disappearance as sites of human practices in social politics of placement, dislocation, and transformation within and across nationally marked boundaries. Special attention is paid to such issues as codifications of the world stage, regimes of intelligibility, and productive relations between nationally designated performances and pregnant moments of imagination exceeding such designation in the theatres of modern history. Further discussion is devoted to the different ways in which textual scenes, theatrical productions, intellectual articulations, and public events explored in this seminar converge to evoke transformational styles of social subjects, forms of cultural embodiments, and methods of political belongings in the midst of a crisis-ridden era of Globalization. Readings include

theorists Antonio Gramsci, Walter Benjamin, Edward Said, Giorgio Agamben and Alain Badiou, Li Dazhao, and Ding Ling; dramatists Bertolt Brecht, Caryl Churchill, Brian Friel, Ama Ata Aidoo and Wole Soyinka, Kong Shangren, Ouyang Yuqian, and Guo Moruo, as well as a selection of cinematic works, visual arts, and multimedia live performances produced by contemporary multilingual artists.

[THETR 4200/6200 Parody (also ENGL/ FGSS 4270/6370) (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. N. Salvato.

This course examines a number of recent imitative texts in order to distinguish the rich variety of political agendas and aesthetic rationales for postmodern parody.]

THETR 4260 Adaptation: Text/ Theatricality (also VISST 4260) (LA-AS)

Spring. 4 credits. Prerequisite: permission of instructor. B. Milles.

Mounting a script into a show is a process of adaptation from page to stage. This course challenges the boundaries of text to discover the possibilities of performance. Asks: How do we translate inspiration into tangible (or intangible) theatrical imagery? Working in workshop format as actors and writers, students explore the process of developing theatre pieces based on a variety of sources.

THETR 4270 Advanced Seminar in Shakespeare: Shakespeare and Marlowe (also ENGL 4270) # (LA-AS)

Fall. 4 credits. B. Correll.

For description, see ENGL 4270.

THETR 4310 Theory of the Theatre and Drama (also GERST 4310, THETR 6310) # (LA-AS)

Fall. 4 credits. H. Yan.

This course is a survey of dramatic theory and theories of theatrical representation from Aristotle to the present. Although covering a span of over two thousand years, the point will be to focus our analysis on a smaller number of key representative texts from the European, American, and postcolonial traditions. In so doing we will seek to develop a close reading of each text, while at the same time exploring both their reception within the context in which they emerged as well as their importance in the ever-evolving process of the institutions of theatre and drama over greater periods of time. Participants will be expected to read carefully the primary and background texts assigned for each session and come to class prepared to raise and answer questions about the material at hand.

THETR 4320 Theatre and Society: A Comparative Study of Asian Dramatic Cultures (also ASIAN 4435/6632, THETR 6320) @ (CA-AS)

Spring. 4 credits. H. Yan.

This course is a study of Chinese and Japanese theatres with an emphasis on the profound ruptures and variable continuities between “the traditional” and “the modern” aesthetic practices as embodied in the dramatic movements in both countries since the beginning of the 20th century. While major traditional forms of Chinese and Japanese theatres will be introduced and studied in the course, plays by modern Chinese authors such as Hu Shi, Ouyang Yuqian, Hong Shen, Cao Yu, Guo Moruo, and Lao She, modern Japanese authors such as Kishida Kunio, Kubo Sakae, Yukio Mishima, Masakazu Yamazaki, Minoru Betsuyaku, and Seichi Yashiro will be

examined with special attention paid to the transformative ways in which those artists engage their respective traditions and the cultural forces of international modernisms. The aesthetic, social, and political cross-currents between these two historically distinctive Asian dramatic cultures will be further explored in their differential relationships with, and shifting placements in, the changing force fields of globalizing modernity throughout the century. DVDs and other visual materials are used.

[THETR 4360 The Female Dramatic Tradition (also FGSS 4330) (LA-AS)]

Spring. 4 credits. Next offered 2010–2011. S. Warner.

Is there a “female dramaturgy?” What is the female tradition in the theatre? This course explores these questions through an investigation of texts by women dramatists, including Hrotsvitha, Aphra Behn, and Caryl Churchill, as well as theory by such critics as Sue Ellen Case and Jill Dolan.]

[THETR 4400 Romantic Drama (also ENGL 4440/6440, THETR 6440) (LA-AS)]

Fall. 4 credits. Next offered 2011–2012. R. Parker.]

THETR 4450 Text Analysis for Production: How to Get from the Text onto the Stage (also ENGL 4450, VISST 4545)

Spring. 4 credits. Limited to 15 students.

Prerequisite: THETR 2500 or 2810 or 3980, or permission of instructor. B. Levitt.

Examines the play as the central, essential source for production decisions made by the actor, the director, the designer, and the dramaturg. Students “present” their conclusions about the performance of studied texts through project work as either an actor, director, designer, or dramaturg, as well as through two to three papers.

[THETR 4460 Shakespeare in (Con)text (also ENGL 4210, VISST 4546) # (LA-AS)]

Fall. 4 credits. Limited to 15 students.

Prerequisite: permission of instructor. Next offered 2010–2011. B. Levitt.

Examines how collaboration among stage directors, designers, and actors leads to differing interpretations of plays. The course focuses on how the texts themselves are blueprints for productions with particular emphasis on the choices available to the actor inherent in the text.]

THETR 4470 Hamlet: The Seminar (also ENGL 4820) # (LA-AS)

Fall. 4 credits. Limited to 15 students.

Prerequisites: THETR 2400, 2410, 2420 or equivalent and permission of instructor. B. Levitt.

The most studied and written about work in Western Literature outside the Bible, Hamlet, according to Harold Bloom, is our secular savior and our ambassador to death. This course centers on a close reading of the play. Through research and assigned readings the course tests theoretical viewpoints about the play against the text itself by reading the theory in relationship to the production history.

THETR 6000 Proseminar in Theatre Studies

Spring. 4 credits. Prerequisite: graduate standing.

An introduction to the theory and methods involved in the study of the theatre. Attention focuses on pedagogy and the profession in Part I. Part II explores current scholarly trends.

THETR 6050 Camp, Kitsch, and Trash (also ENGL 6510, FGSS 6050)

Spring. 4 credits. N. Salvato.

This seminar investigates histories of taste; the traffic between popular culture and “high art”; and the relationships among material artifacts, identity politics, and community formations.

[THETR 6060 Passionate Politics (also FGSS 6040)]

Fall. 4 credits. Next offered 2010–2011.

S. Warner.

Complete Course Title: Passionate Politics: Affect, Protest, Performance. This course explores the relationship between affect, performance, and political engagement.]

THETR 6070 Transnational Imagination: A Seminar on Modern Theatre and Cultural History (also THETR 4070)

Fall. 4 credits. H. Yan.

For description, see THETR 4070.

THETR 6270 Studies in Shakespeare: Shakespeare and Marlowe (also ENGL 6270)

Fall. 4 credits. B. Correll.

For description, see ENGL 6270.

[THETR 6300 Melodrama, Modernism, and Modernity (also ENGL 6300)]

Fall. 4 credits. Next offered 2010–2011.

N. Salvato.

This course examines the history of melodrama and the various theories, often sharply divergent, that have developed about and around it.]

THETR 6310 Theory of Theatre and Drama (also COML 6051, GERST/ THETR 4310)

Fall. 4 credits. H. Yan.

For description, see THETR 4310.

THETR 6320 Theatre and Society: A Comparative Study of Asian Dramatic Cultures (also ASIAN 4435/6632, THETR 4320)

Spring. 4 credits. H. Yan.

For description, see THETR 4320.

THETR 7100 The Pedagogy of Theatre

Fall. 4 credits. Corequisite: relevant undergraduate class and permission of instructor. Staff.

Provides graduate students in the field of theatre an opportunity to work directly with a faculty member to explore pedagogical theory and practice for undergraduate theatre classes in all areas of the curriculum.

Acting

THETR 1550 Rehearsal and Performance

Fall or spring. 1–2 credits; 1 credit per production experience per semester up to 2 credits per semester. Students must register for course in semester in which credit is earned. Prerequisite: students who are assigned roles after tryouts at department’s scheduled auditions. Students should add this course only after they have been assigned roles. S–U grades only.

The study, development, and performance of roles in departmental theatre or dance productions or the study and practice of directing as experienced in assisting faculty and guest directors.

THETR 2050 Rehearsal Workshop

Fall or spring. 2 credits. Limited to 30 students. Prerequisites: participation in a particular department production and permission of instructor. Staff.

Enables students participating in a particular production to gain expertise and/or knowledge to contribute to that production. The focus of the course depends on the needs of a particular production (e.g., history, choreography, textwork, dramaturgy).

THETR 2800 Introduction to Acting (LA-AS)

Fall and spring. 3 credits. Limited to 16 students per sec. Preregistration and registration only through roster in department office, 223 Schwartz Center. No online registration. Staff.

An introduction to the actor's technique and performance skills, exploring the elements necessary to begin training as an actor, i.e., observation, concentration, and imagination. Focus is on physical and vocal exercises, improvisation, and text and character. There is required play reading, play attendance, and some scene study.

THETR 2810 Acting I (LA-AS)

Fall and spring. 3 credits. Limited to 14 students per sec. Prerequisites: sophomore standing and above; THETR 2800 and audition. Registration only through roster in department office, 223 Schwartz Center.

Practical exploration of the actor's craft through exercises in physical and psychological action, improvisation and scene study.

[THETR 2820 Standard American Stage Speech (LA-AS)]

Fall. 3 credits. Limited to 10 students. Prerequisites: THETR 2800 and permission of instructor. Next offered 2010–2011. A. Van Dyke.

Introduction to Standard American Stage Speech. Study of various regional American accents and Standard American Stage Speech using the International Phonetic Alphabet (IPA) as a way to designate the vowel, diphthong, and consonant sounds of spoken English.]

THETR 2840 Speech and Dialects for Performance (LA-AS)

Spring. 3 credits. Limited to 10 students. Primarily for department majors. Prerequisites: THETR 2810 and permission of instructor. A. Van Dyke.

Development of speech and dialects in dramatic text.

THETR 3800 Acting II (LA-AS)

Fall. 3 credits. Limited to 12 students. Prerequisite: THETR 2810 and audition. M. Dreyer.

Continuation of Acting I. Special consideration is given to a physical approach to characterization.

THETR 3810 Acting III: Advanced Scene Study (LA-AS)

Spring. 3 credits. Limited to 10 students. Prerequisite: audition. Strong preference given to those who have taken THETR 4460. B. Levitt.

Focuses on advanced problems for the stage. Monologues and scenes are drawn from Shakespeare and classical sources.

THETR 3840 Commedia; A Contemporization of Physical Acting Styles and the Comic Approach (also VISST 3850) (LA-AS)

Spring. 3 credits. Limited to 10 students. Prerequisite: THETR 2810, and permission of instructor. B. Milles.

A wholly physical acting course based in the practices of Commedia dell'arte—stock characters, physical lazzi, improvisation, street theatre—using improvisation, some mask work, clown and viewpoint training. An exploration of how to use the body to illuminate text, and how to mine text to maximize comedy.

THETR 3850 Advanced Studies in Acting Techniques (LA-AS)

Fall or spring. 3 credits; may be repeated for credit. Limited to 8 students.

Prerequisites: THETR 2810, 2840, audition, and permission of instructor. A. Van Dyke. Scene study using plays that require the accents studied in THETR 2840.

THETR 3860 Solo Performance (LA-AS)

Fall. 4 credits. Prerequisites: THETR 2800, 2810, and permission of instructor. B. Levitt.

THETR 3860 was designed to explore the evolution and performance of material from nonscripted texts and focus on the performance of those texts by the solo performer. Material may be drawn from newspapers, novels, poetry, nonfiction, biography, autobiography, and interviews.

[THETR 4810 Senior Seminar in Theater Exploration]

Spring. 3 credits. Prerequisites: 3000-level acting course and/or senior theater student by permission of instructors. Next offered 2010–2011. B. Levitt and A. Van Dyke.

This seminar will re-explore and summarize the techniques taught in acting and theater classes relating to performance and serve as a culminating experience for those undergraduates whose major study of interest during their four years at Cornell has been in the performance side of Theatre Arts.]

Directing**THETR 1770 Student Laboratory Theatre Company**

Fall or spring. 1–2 credits.

The Student Laboratory Theatre Company (SLTC) is a group of student-actors who earn credit by acting in three scenes directed by students taking THETR 4980. Students enrolling in SLTC for credit earn 1 credit for two projects and 2 credits for three projects. SLTC also meets with directors once a week.

THETR 3980 Fundamentals of Directing I (also VISST 3798) (LA-AS)

Fall. 3 credits. Limited to 9 students. Prerequisite: permission of instructor. Special consideration given to students who have completed THETR 2800 or are intending to continue in area of stage or screen directing. Students should see instructor one year in advance to sign up for course. D. Feldshuh.

Focused, practical exercises teach the student fundamental staging techniques that bring written text to theatrical life. A core objective is to increase the student's awareness of why and how certain stage events communicate effectively to an audience. Each student directs a number of exercises as well as a short scene.

THETR 4980 Fundamentals of Directing II (LA-AS)

Spring. 4 credits. Limited enrollment. Prerequisite: THETR 2800 and 3980, and permission of instructor. Recommended: THETR 2500 and 2810. D. Feldshuh.

Builds on the staging techniques learned in Fundamentals of Directing I. In this course each student directs actors from the Student Laboratory Theatre Company in a series of projects and public presentations focusing on specific directorial challenges.

THETR 4990 Practicum in Directing

Fall or spring. 1–4 credits. Prerequisites: THETR 2400, 2500, 2800, 3980, 4980, and permission of instructor. D. Feldshuh.

Allows the student who has completed the appropriate prerequisites the opportunity to direct a full presentation of theatre in conjunction with a faculty mentor. May also involve an internship with a prominent director on campus or the opportunity to assistant direct a faculty or guest director.

Playwriting**THETR 3480 Playwriting (LA-AS)**

Fall. 4 credits. Limited to 12 students. Prerequisite: permission of instructor. B. Milles.

Various approaches and techniques are examined as the student is introduced to the art and craft of dramatic writing. The student is required to read dramatic texts, observe theatre productions and rehearsals, and write. The semester culminates in the completion of a 20- to 30-minute one-act play.

[THETR 3490 Advanced Playwriting (LA-AS)]

Spring. 4 credits. Prerequisite: THETR 3480 or permission of instructor. Next offered 2010–2011. B. Milles.

Continuation of THETR 3480. An intensive writing class. Students are encouraged to explore a rich creative landscape culminating in the completion of a full-length play.]

[THETR 4970 Seminar in Playwriting]

Fall or spring. 1–4 credits. Prerequisite: THETR 3480 and 3490 and permission of instructor. Next offered 2010–2011. Staff.

Extension of THETR 3480 and 3490. Students formulate a process for developing a full-length play, which they develop over the course of the semester.]

Design, Technology, and Stage Management**Design****THETR 2500 Fundamentals of Theatre Design and Technology (LA-AS)**

Fall and spring. 4 credits. Limited to 12 students. Not open to first-semester freshmen. Registration through department roster only in 223 Schwartz Center. Highly recommended: concurrent enrollment in 1 credit of Production Lab (THETR 1510 or 2510). Students required to purchase materials that instructors specify (approx. cost \$50). S. Lambert, W. Cross, E. Intemann, and S. Bernstein.

Lectures, discussion, and project work introduce the principles of designing scenery, costumes, lighting and sound, and the technical process of realizing designs on stage.

THETR 2540 Theatrical Makeup Studio
Spring. 3 credits. Limited to 10 students.
Prerequisite: permission of instructor.
Registration only through department roster in 223 Schwartz Center. Students are required to purchase makeup kits that instructor provides (approx. cost \$50). It is expected that any interested student will have taken courses within the department in any of the areas of: design, acting, dance, or film, or will have completed rehearsal and performance (THETR 1550) credit. Next offered 2010-2011.

Basic technique of makeup design and application for the stage including corrective, old age, likeness, and animals; use of some three-dimensional makeup and false facial hair.]

THETR 3190 Music, Dance, and Light (also DANCE 3590, VISST 3519) (LA-AS)

Fall. 3 credits. Limited to 12 students.
Attendance at dance concerts and music concerts required. Next offered 2010-2011.
E. Intemann and A. Fogelsanger.

Artistic values, parameters, and concerns of music (sound design), dance, and lighting design are compared and contrasted, and the combination of design elements is analyzed in contemporary dance.]

THETR 3410 CAD Studio for Theatre Design (LA-AS)

Spring. 3 credits. Prerequisite: THETR 2500 and 3400 and permission of instructor.
Registration only through department roster in 223 Schwartz Center. Experience in theatre production and graphic communication helpful but not essential.
S. Brookhouse and staff.

Students will utilize commercially available computer assisted design software to explore the process of designing scenery, costume and lighting for the live theatre. AutoCad, Vectorworks and Photoshop are some of the applications utilized.

THETR 3430 Costume History: From Fig Leaf to Vanity # (LA-AS)

Fall. 3 credits. Limited to 20 students.
S. Bernstein.

Offers an overview of the history of clothing from the first signs of clothing to the early 20th century. It investigates social, political, economic, technological, geographic, ecological, and artistic influences on costume.

THETR 3620 Lighting Design Studio I (also DANCE 3660, VISST 3620) (LA-AS)

Fall. 4 credits. Limited to 6 students.
E. Intemann.

The theory and practice of lighting design as a medium for artistic expression. This course explores the aesthetic and mechanical aspects of light and their application in a variety of disciplines. Emphasis is on understanding lighting's function in an environment and manipulating light effectively. Artistic style and viewpoint are also covered.

THETR 3640 Scenic Design Studio (LA-AS)

Fall and spring. 3 credits. Limited to 10 students. Prerequisite: THETR 2500 and 3400 or permission of instructor.
Experience in theatre production and drawing skills is helpful but not essential. Students are required to purchase materials that instructor will specify (approx. cost \$50). Course co-meets with THETR 4640.
K. Goetz.

An exploration of the scene design process for the live theatre. Students will execute design projects employing various media (sketches, paper models, computer graphics, etc.) that examine how elements of stage craft, architecture, and interior design can be employed to support and enhance the action of dramatic texts.

THETR 3650 Automated Lighting and Control

Fall. 3 credits. Limited to 8 students.
E. Intemann and F. Sellers.

Covers the understanding and application of light control technologies, including electrical systems, color, optics, dimming protocols, and console programming. Students complete a series of projects culminating in the programming and use of moving fixtures and lighting visualization software.

THETR 3660 Costume Design Studio (LA-AS)

Spring. 3 credits; may be repeated for credit Limited to 10 students. Students are required to purchase materials that instructor will specify (approx. cost \$70).
S. Bernstein.

Design of costumes for the theatre, concentrating on script and character analysis, period research, design elements, figure drawing and rendering skills, and an understanding of production style.

THETR 3680 Sound Design and Digital Audio (also DANCE 3680, MUSIC 3431) (LA-AS)

Fall and spring. 3 credits. Prerequisite: permission of instructor. Recommended: some experience with audio/video recording or editing. W. Cross.

Basics of digital audio, psychoacoustics, and sound design as they apply to theatre, film, and music production. Weekly projects require time spent in the studio outside of class. Students create soundtracks for text and moving image, with final projects in 5.1 surround sound, using Pro Tools and Digital Performer.

THETR 3690 Interactive Performance Technology (also DANCE 3560, MUSIC 3441) (LA-AS)

Fall. 3 credits. Prerequisite: laptop computer and MAX/MSP and Jitter software required, see www.cycling74.com for student software pricing. Lab performance at end of semester. Next offered 2010-2011. W. Cross and A. Fogelsanger.

Introduction to the multimedia programming platforms MAX/MSP/Jitter and their application to computer-interactive dance (interactive dance technology). Intended to bring together programmers and dancers.]

THETR 3710 Costume Design Studio II (LA-AS)

Fall. 3 credits. Limited to 10 students.
Prerequisite: THETR 3660, or THETR 2500 with permission of instructor. Students are required to purchase materials that instructor will specify (approx. cost \$50).
S. Bernstein.

Explores unconventional costume designs for theatre and dance. Deals with the special considerations found in many plays and performance pieces, such as the theatricalization of nonhuman subjects (e.g., animals, plants, machines, magical creatures), the visualization of music, or the support or enhancement of movement. Also covers alternative (some non-Western) ways to create character through costume, makeup, masks, and wearable forms of puppetry.

THETR 4620 Lighting Design Studio II (also DANCE 4660, VISST 4563) (LA-AS)

Spring. 4 credits. Limited to 6 students; may be repeated for credit. Prerequisite: THETR 2500 or 3620 or permission of instructor. E. Intemann.

Concentrates on designing lighting for different genres of performance in various venues. Emphasis is placed on developing both the visual sophistication and the technical artistry of the lighting designer. Commitment, personal style, and professional presentation are stressed.

THETR 4640 Scene Design Studio II (LA-AS)

Fall and spring. 3 credits. Limited to 10 students. Prerequisite: THETR 3640 or permission of instructor. Students are required to purchase materials that instructor will specify (approx. cost \$50). Course co-meets with THETR 3640.
K. Goetz.

Builds on the techniques learned in THETR 3640. Students will execute more complex design projects tailored to their particular skills, goals, and interests, with emphasis on developing professional standards and practices that would prepare the student for a major design assignment on a department production.

Technology

THETR 2560 Technical Production Studio II

Spring. 3 credits. Limited to 6 students. \$30 materials fee. Prerequisite: THETR 2500 or permission of instructor. Additional hands-on time in prop and paint shops required, to be discussed. Staff.

Scene Painting: introduction to the basic techniques of painting scenery, including but not limited to the layout and painting of bricks, marble, stone, and wood grain for the theatre. Individual projects in scene painting and participation on paint crew for productions are included.

Stage Properties: introduction to the processes of propmaking, including furniture construction and upholstery techniques, use of shop tools and materials, period research, and painting and finishing.

THETR 3400 Theatrical Drafting and Technical Drawing Studio

Fall. 3 credits. Limited to 5 students.
Prerequisite: permission of instructor.
S. Brookhouse.

Implementation of the fundamentals of drafting and technical drawing. Introduction of the concept of an individual style in the approach to drafting for the theatre. Involves a series of projects to familiarize students with the convention and process of visualization and drafting, using both mechanical drafting techniques and AUTOCAD.

THETR 3410 CAD Studio for Theatre Design (LA-AS)

Spring. 3 credits. Prerequisite: THETR 2500 and 3400 and permission of instructor.
Registration only through department roster in 223 Schwartz Center. Experience in theatre production and graphic communication helpful but not essential.
S. Brookhouse and staff.

Students will utilize commercially available computer-assisted-design software to explore the process of designing scenery, costume, and lighting for the live theatre. AUTOCAD,

Vectorworks, and Photoshop are some of the applications utilized.

THETR 3520 Themed Entertainment: The Technical Perspective

Fall. 3 credits. Limited to 12 students.
R. Archer.

Exploration into the integration of art and science in today's theme parks and interactive entertainment attractions. Papers, projects, and discussions deal with planning and development aspects of large-scale entertainment projects including architecture, engineering, construction, and attraction installation. Focus is on the specialized entertainment technologies that make these attractions work: audio and lighting design, ride and show control systems, and special effects.

THETR 3540 Stagecraft Studio

Fall. 3 credits. Prerequisite: THETR 2500 or permission of instructor. Highly recommended: concurrent enrollment in at least 1 credit of THETR 1510 or 2510.
R. Archer.

Exploration of the techniques and practice of theatre operation, scenic construction, stage mechanics, rigging, painting, and model building.

THETR 3560 Costume Construction Studio

Spring. 3 credits. Highly recommended: concurrent enrollment in at least 1 credit of THETR 1510 or 2510. Lab fee: \$100 (paid in class). R. MacPike.

Project/lecture/discussion class in costume research, patterning, cutting, construction, and fitting.

THETR 3600 Costumes: Special Projects

Fall. 3 credits; may be repeated for credit. Prerequisite: permission of instructor. Lab fee: \$150 (paid in class). R. MacPike.

Designed for students who have completed a basic construction class (in THETR or FSAD, or another department). Each fall, this project-oriented course focuses on one of the following areas of costume crafts: millinery, fabric modification, or mask making. Students should check with the instructor to find out each fall which topic is being offered. Fall 2009 special project is mask-making.

Stage Management

THETR 1530 Stage Management Production Laboratory I

Fall and spring. 1–2 credits; may be repeated for credit. Before registering, students must attend orientation meeting at 7:30 P.M. in Kiplinger Theatre at Schwartz Center on first Tuesday of classes. Prerequisite: permission of instructor. P. Lillard.

Practical experience in theatrical production as assistant stage manager for a dance theatre concert or as a stage manager for readings, Black Box lab productions, or SLTC under the supervision of the faculty production manager. THETR 3700 complements this course.

THETR 2530 Stage Management Laboratory II

Fall and spring. 1–5 credits; may be repeated for credit. Before registering, students must attend orientation meeting at 7:30 P.M. in Kiplinger Theatre at Schwartz Center on first Tuesday of classes. Prerequisite: permission of instructor.
P. Lillard.

Practical experience in theatrical production as assistant stage manager for a season production under the supervision of the

faculty production manager. THETR 3700 complements this course.

THETR 3530 Stage Management Laboratory III

Fall and spring. 1–4 credits; may be repeated for credit. Before registering, students must attend orientation meeting at 7:30 P.M. in Kiplinger Theatre at Schwartz Center on first Tuesday of classes.

Prerequisite: permission of instructor.

P. Lillard.

Practical experience in theatrical production as stage manager for a dance theatre concert or an AUTP production under the supervision of the faculty production manager. THETR 3700 complements this course.

THETR 3700 Stage Management Studio

Fall. 2 credits. Prerequisite: THETR 2500 or 2800 or permission of instructor. Students are required to purchase materials that instructor will specify (approx. cost \$10).
P. Lillard.

Introduction to the concepts and techniques of stage management as they relate to specific areas of production. Development of relevant communication skills and an understanding of the production process as experienced by a working stage manager or assistant stage manager. THETR 1530, 2530, and 3530 complement this course.

THETR 4530 Stage Management Laboratory IV

Fall and spring. 1–5 credits; may be repeated for credit. Prerequisite: admission to Advanced Undergraduate Theatre Program. P. Lillard.

Practical experience in theatrical production as stage manager for a season production under the supervision of the faculty production manager.

Production Laboratories

THETR 1510 Production Laboratory I

Fall and spring. 1–3 credits; may be repeated for credit. No prerequisites or experience required. Orientation meeting at 7:30 P.M. first Tuesday of classes each semester in Kiplinger Theatre at Schwartz Center. P. Lillard, S. Brookhouse and R. MacPike.

Provides practical experiences in theatrical production. Students can work on scenery, costumes, properties, lighting, or stage crew.

THETR 2510 Production Laboratory II

Fall and spring. 1–3 credits; may be repeated for credit. Prerequisite: permission of instructor. Orientation meeting at 7:30 P.M. on first Tuesday of classes each semester in Kiplinger Theatre at Schwartz Center. P. Lillard, D. Hall, W. Cross, and R. MacPike.

Practical experience in theatrical production, as a light board operator, sound board operator, video operator, follow-spot operator, sound technician, head dresser or scenery/props special project.

THETR 3510 Production Laboratory III

Fall and spring. 1–3 credits; may be repeated for credit. Prerequisite: permission of instructor. P. Lillard, R. Archer, S. Brookhouse, D. Hall, E. Intemann, and S. Bernstein.

Practical experience in theatrical production as a master electrician, assistant technical director, assistant costume shop manager, or assistant to a faculty or guest director or designer.

THETR 4510 Production Laboratory IV

Fall and spring. 1–4 credits; may be repeated for credit. Prerequisite: admission to Advanced Undergraduate Theatre Program. P. Lillard, R. Archer, S. Bernstein, D. Hall, W. Cross, and E. Intemann.

Practical experience in theatrical production, in the position of designer, shop manager, technical director, or sound engineer.

Independent Study, Internships, and Honors

THETR 3000 Independent Study

Summer, fall, or spring. 1–4 credits. Independent study in the theatre allows students the opportunity to pursue special interests not treated in regularly scheduled courses. A faculty member, who becomes the student's instructor for the course, must approve the student's program of study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study, which is available in 223 Schwartz Center.

THETR 4850 Undergraduate Internship

Fall, spring, or summer. 1–3 credits. To be eligible to enroll and receive credit for an internship, students must either be majors or be concentrators in the department. Students are responsible for arranging their own internships in consultation with the faculty in their area of choice *before* preregistration for the semester in which the internship is planned to take place. To receive credit within this course, the internship must be unpaid. Students must follow the rules and procedures stated in the departmental internship form.

THETR 4950 Honors Research Tutorial

Fall or spring. 4 credits. Prerequisite: honors students in theatre.

First of a two-semester sequence (the second is THETR 4960) for seniors engaged in an honors project.

THETR 4960 Honors Research Tutorial

Fall or spring. 4 credits. Prerequisite: honors students in theatre.

Second of a two-semester sequence (the first is THETR 4950) for students engaged in an honors project.

THETR 7210 Independent Study for Graduate Students in Theatre

Fall and spring. 1–4 credits.

Independent study in theatre allows graduate students the opportunity to pursue special interests not treated in regularly scheduled courses. A faculty member, who becomes the student's instructor for the course, must approve the student's program of study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study, which is available in 223 Schwartz Center.

Film

Faculty: A. Villarejo, D. Fredericksen (director of undergraduate studies in film), S. Haenni (on leave fall 2009), A. Hiss, L. Patti, M. Rivchin.

The study of film began in this department in the 1930s and continues to be based here. In the intervening years, however, it has also spread into a significant number of other departments in the College, including Africana studies, anthropology, Asian studies,

comparative literature, English, German studies, government, history, psychology, Romance studies, and FGSS. This proliferation of courses has been accompanied by a comparable proliferation of perspectives and faculty concerns, e.g., the relationship of national cinemas to national literatures and specific cultures, film's relationships to myth and ideology, the use of film as historical evidence, film's efficacy as a rhetorical medium, and film's contribution to perennial issues in aesthetics, the history of the arts, and studies in cognition. However, foundational courses in film production and in the history, theory, and criticism of film as an art are centered in this department.

This richness of courses and perspectives is matched by the ways in which students may make film the focus of their undergraduate studies. The three ways currently being used are: (1) majoring in film within the Department of Theatre, Film, and Dance; (2) constructing an individually tailored Independent Major in film (including the possibility of placing film in tandem with another medium or discipline); and (3) focusing on film as a College Scholar. Students interested in options 2 or 3 should consult both Don Fredericksen (director of undergraduate studies in film) and the director of the College Scholar Program or the director of the Independent Major program. Students interested in the first option should consult Don Fredericksen.

Students who do not wish to major in film may elect to minor in film under the new guidelines approved by the College of Arts and Sciences. Details of this new option are described below. If interested, consult with Don Fredericksen, director of undergraduate studies in film. In addition, students should be aware that the college has a five-course minor in visual studies, which can be taken independently of, or in conjunction with, a major in film. Students interested in the visual studies minor should contact the undergraduate coordinator, Jessica Smith, in the Department of Art History and Visual Studies.

Film Major Requirements

The department's film major requires a total of 50 credits in film and related courses. Students should note that a number of film courses—including two required "core" courses: (FILM 3750 and 3760)—are offered in alternating years. This means that *students cannot fulfill the requirements for the major in less than two years* and that they should plan accordingly, in consultation with their major advisor. In particular, students must plan to be in residence at Cornell during the fall semesters of both their junior and senior years to take FILM 3750 and 3760. Within the "core" required courses, FILM 2740, Introduction to Film Analysis, is to be taken during the sophomore year. **Note: Prospective majors must earn a grade of B (not B-) or higher in FILM 2740 to be accepted into the major. Students may not enter the major until they have completed FILM 2740 in the fall semester of their sophomore year.**

Majors wishing to use the production courses in a substantial manner must plan carefully and work within certain limits. These courses are FILM 3240, 3770, 3830, 4220, 4780, and 4930. *Enrollment in each of these courses is limited by the nature of the work and by*

facilities. Enrollment in FILM 4220, 4770, 4780, and 4930 depends on the quality of previous work in FILM 3770 and/or 3830; enrollment is not guaranteed. Majors *without* a strong interest in production can complete the production requirement with one course: FILM 3770, after they have taken FILM 2740 in their sophomore year. The total credits in production courses cannot exceed 20 hours; this limit is strictly enforced.

1. A core of *four* film courses:

FILM 2740 Introduction to Film Analysis (offered every fall semester) 4

[FILM 3750 History and Theory of Commercial Narrative Film (offered alternate fall semesters; next offered fall 2010 (prerequisite for film majors: FILM 2740) 4]

FILM 3760 History and Theory of Documentary and Experimental Film (offered alternate fall semesters) (prerequisite for film majors: FILM 2740) 4

FILM 3770 Introduction to 16mm and Digital Filmmaking (offered every semester) 4

2. One of the following theatre courses:

THETR 2500 Fundamentals of Theatre Design/Technology (offered every semester) 4

THETR 2800 Introduction to Acting (offered every semester) 3

THETR 3980 Directing I (prerequisite: permission) (offered every fall semester) 3

3. *Four* courses (15–16 credits) in film offered by Theatre, Film and Dance as below, or (with permission of advisor) by other departments:

FILM 2640 Stardom (offered fall 2009)

FILM 2650 Studies in Film Analysis: Hitchcock's Films (offered fall 2009) 4

FILM 2760 Survey of American Film (offered alternate years; next offered spring 2010) 4

ITAL 2950 Cinematic Eye of Italy 3

FILM 3290 Political Theory and Cinema 4

FILM 3330 Korean History, Society, and Film 3

[FILM 3430 International Cinema (offered alternate years; next offered spring 2011) 3]

[FILM 3440 American Film Melodrama (next offered 2010–2011) 4]

FILM 3520 Short Cinema (offered alternate years; offered spring 2010) 4

FILM 3690 Fast-Talking Dames and Sad Ladies: 1940s and Now (offered yearly; offered spring 2010)

[FILM 3720 Archive Fever (offered alternate years; next offered fall 2010) 4]

FILM 3790 Modern Documentary Film (offered alternate spring semesters; offered spring 2010) 4

FILM 3830 Screenwriting (offered TBA) 4

FILM 3901 Brazilian Cinema: 1960s to Present 4

[FILM 4220 Cinematography (offered alternate years; next offered fall 2010) 3]

ASIAN 4410 Chinese Film 4

ASIAN 4436 Topics in Indian Film 4

FILM 4550 History of Modern Polish Cinema (offered alternate years; offered fall 2009) 4

FILM 4730 Film and Spiritual Questions (offered alternate spring semesters; offered spring 2010) 4

[FILM 4740 Jung, Film, and the Process of Self-Knowledge (offered alternate years; next offered spring 2011) 4]

[FILM 4750 Seminar in the Cinema I (offered most years; next offered fall 2010; topic varies; may be repeated for credit) 4]

FILM 4760 Seminar in the Cinema II (offered spring 2010 and 2011; topic varies; may be repeated for credit) 4

FILM 4780 Intermediate Film and Video Projects: Workshop (offered alternate years; next offered fall 2009) 4

GOVT 4809 Politics of '70s Film 4

FILM 4930 Advanced Film and Video Projects (offered every spring) 4

4. 15 credits of related course work inside or outside the Department of Theatre, Film and Dance, as approved by the major advisor. The courses chosen to fulfill this requirement should reinforce each major's particular interest in film and will not necessarily be film courses *per se*. For example, a student interested in the psychology of film, or in ethnographic film, or in film *vis-à-vis* intellectual or social history, or in film and social change will be encouraged to choose related course work in those areas.

5. Students must earn at least a B (not B-) in FILM 2740 to enter the major. In all subsequent courses used for the major a grade of C (not C-) must be achieved. Courses in which these minimums are not achieved must be repeated, if the student is to receive credit in the major.

6. Course work in production cannot exceed 20 credit hours.

Film Minor

The Film Minor serves students in other majors who wish to undertake, and have noted on their transcripts, some substantial study in film. The one path excluded from the minor is the one in film production; in this regard the film minor differs from the theatre and dance minors. The film program is not able to accommodate further demands upon the current film production faculty, facilities, and equipment. It is the judgment of the film faculty that minors need to have a general knowledge of film analysis/theory and film history, thus the prescribed courses in requirements one and two. In addition film minors will choose three elective courses from history, theory, and criticism of film.

To be accepted into the film minor, please contact Don Fredericksen, director of undergraduate studies in film studies.

Requirements:

1. FILM 2740 Introduction to Film Analysis
2. Either FILM 3750, History and Theory of Narrative Film, or FILM 3760, History and Theory of Documentary and Experimental Film
3. Three additional film courses, chosen from the list of film courses suitable for satisfying requirement three in the film major, excluding—except in very special and limited cases—FILM 3770, Introduction to 16mm and Digital Filmmaking; FILM 4220, Cinematography; FILM 4780, Intermediate Film and Video Projects; and FILM 4930, Advanced Film and Video Projects. Freshman Writing Seminars focused on film cannot be used to satisfy this requirement.
4. To enter the minor, a student must earn a C or higher in FILM 2740. (To enter the film major a student must earn a B or higher in this course.)
5. The film minor students cannot be accommodated in the film production sequence (FILM 3770, 4220, 4780, and 4930), given current demands upon those courses by the film majors. This restriction does not presently apply to FILM 3830, Screenwriting, although were demand to overwhelm this course, it would have to be restricted as well.

For more information, visit our web site at www.arts.cornell.edu/theatrearts/academics/film/FilmMinorRequirements.asp or go to 223 Schwartz Center for the Performing Arts.

Computing in the Arts Undergraduate Minor

A minor in Computing in the Arts with an emphasis on film is available both to film majors and to students majoring in other subjects. For more information, see "Computing in the Arts Undergraduate Minor" under "Departments, Programs and Courses" in the "College of Arts and Sciences" or www.cis.cornell.edu/ComputingArts.

Honors

Students who have maintained a GPA of 3.7 in their film major courses, and an average of 3.2 in all courses, may elect to work for honors in film during their senior year. They must consult with their advisor *in the spring of their junior year* about the honors program in film. Honors projects are possible in filmmaking, screenwriting, and film analysis (history, criticism, theory). Projects in filmmaking and screenwriting require a written analytical component related to the creative work.

The Advanced Undergraduate Filmmaking Program

Through FILM 4930 course work, the department offers advanced study in filmmaking to students who qualify on the basis of outstanding achievement in film studies and film production courses. Contact Marilyn Rivchin for details.

Film Study Abroad

The College of Arts and Sciences, through this department and in concert with a number of other American colleges and universities, offers up to a full year of study at the Paris Center for Critical Studies and, through the

center, at the University of Paris III. The center's film program is theoretical, critical, and historical. It is most useful to students whose major interest is in the academic study of film and serves as a complement to Cornell's film courses. Fluency in French is required. FILM 2740 and 3750 are prerequisites. Inquiries should be addressed to Professor Fredericksen, Cornell's liaison with the center.

Through the Cornell Abroad office, students have also recently studied film and filmmaking in England, Ireland, Australia, Argentina, and the Czech Republic.

FILM 1512 Philosophy and Film (also PHIL 1512) (KCM-AS)

Summer. 3 credits.
For description, see PHIL 1512.

FILM 2650 Studies in Film Analysis: Hitchcock's Films (also ENGL/FGSS 2630) (LA-AS)

Fall. 4 credits. L. Bogel.
For description, see ENGL 2630.

FILM 2740 Introduction to Film Analysis: Meaning and Value (also FILM 6740, VISST 2174/6174) (LA-AS)

Fall. 4 credits. Limited to 40 students.
Graduate students must enroll in FILM 6740. D. Fredericksen.

Intensive consideration of the ways films generate meaning and of the ways we attribute meaning and value to films. Discussion ranges over commercial narrative, art cinema, documentary, and personal film modes. Prospective film majors must enroll in their sophomore year.

FILM 2760 Survey of American Film (also AMST 2760, VISST 2300) (LA-AS)

Spring. 4 credits. Required film screenings; discussion once a week. S. Haenni.
For description, see AMST 2760.

FILM 2850 Stardom (CA-AS)

Fall. 4 credits. L. Patti.
From heavenly creatures to tabloid trash, this course will explore stardom in cinema, television, and new media. Framed by approaches from semiotics, psychoanalysis, economics, and cultural studies, we will examine histories and theories of stars and star systems, investigating the importance of aesthetic strategies (from three-point lighting to the close-up), technological innovations (from sound to high-definition), industrial formations (from United Artists to SAG), the mass media (from studio publications to online tabloids), and fandom (from autograph auctions to fan fiction). We will discuss Hollywood stardom in tandem with both other national star systems and the transnational circulation of stars. An emphasis on the importance of race and sexuality in the production and reception of stardom will guide our inquiries.

[FILM 2930 Middle Eastern Cinema (also JWST/NES 2793, VISST 2193) @ (LA-AS)]

Fall. 4 credits. Next offered 2010–2011.
D. Starr.]

[FILM 3240 Animation Workshop: Experimental and Traditional Methods (LA-AS)]

Summer. 3 credits. Cost for equipment: \$150. Next offered 2010–2011.
M. Tomlinson.

The art of animation involves many dimensions, including time and motion. This

course introduces students to the fundamentals of traditional animation and the mechanics used to capture the illusion of movement.]

FILM 3250 Animation History and Practice (LA-AS)

Summer. 3 credits. Limited to 12 students.
Equipment fee: \$150.00. M. Tomlinson.
Beginning with the pre-history of animation, optical toys and magic lantern projections, and continuing through a century of animation history to contemporary work, this course investigates the history of animation from around the world, through a variety of hands-on production projects, as well as lectures, discussions, research, and screenings. Combining tactile and digital methods, students create weekly collaborative and individual animated films, incorporating lessons from the historical work studied.

FILM 3290 Political Theory and Cinema (also COML 3300, GERST 3550, GOVT 3705) (CA-AS)

Spring. 4 credits. G. Waite.
For description, see GERST 3550.

[FILM 3430 Inter/National Cinema (CA-AS)]

Spring. 3 credits. Offered alternate years; next offered spring 2010–2011. L. Patti.
The terms transnational and global are frequently invoked to describe the contemporary internationalization of cinema. This course will analyze global cinema in relation to national cinemas.]

[FILM 3440 American Film Melodrama (also AMST/ENGL 3440, FGSS 3450, VISST 3645) (LA-AS)]

4 credits. Recommended: some background in film analysis. Offered alternate years; next offered 2010–2011.
S. Haenni.

Melodramatic styles and themes from the early 20th century to the present; melodrama as a "mode of excess" which registers ideological contradictions and powerfully affects film audiences.]

[FILM 3460 Film Noir (also AMST/VISST 3480) (LA-AS)]

4 credits. Next offered 2011–2012.
For description, see AMST 3480.]

FILM 3520 Short Cinema

Spring. 4 credits. Offered alternate years.
L. Patti.

This course will bring into dialogue a variety of contemporary commercial and experimental cinema and new media to explore the theoretical and historical boundaries of short cinema as a genre. We will watch cartoons, music videos, commercials, trailers, webisodes, DVD bonus features (including interviews and outtakes), youtube clips, cell phone films, Oscar-nominated shorts, and anthology films in order to map the broad terrain of short cinema. Readings will emphasize the industrial and technological underpinnings of short cinema and the commercial, critical, and popular reception of short cinema as we discuss the viability of theorizing short cinema as counter-cinema or minor cinema.

FILM 3690 Fast-Talking Dames and Sad Ladies: 1940s and Now (also ENGL/FGSS 3690) (LA-AS)

Spring. 4 credits. L. Bogel.
For description, see ENGL 3690.

[FILM 3720 Archive Fever

Fall. 4 credits. Next offered 2010–2011.
L. Patti.

This course will examine archival institutions, theories, and practices in the preservation and circulation of American film and the role of distributors as archivists. We will then analyze found footage films and digitality.]

[FILM 3750 History and Theory of the Commercial Narrative Film (also VISST 3175) (LA-AS)

Fall. 4 credits. Prerequisite for film majors: FILM 2740. Offered alternate years; next offered 2010–2011. S. Haenni.

A survey of narrative cinema from around the world, with emphases on early narrative cinema, cinematic realism, interwar European modernist cinema, popular American film, post–World War II art cinema, and recent global cinema.]

[FILM 3760 History and Theory of Documentary and Experimental Film (also VISST 3176) (LA-AS)

Fall. 4 credits. Highly recommended: FILM 2740. Fee for screening expenses: \$10 (paid in class). Offered alternate years.
A. Villarejo.

Analyzes canonical works in documentary film to World War II, and canonical works in the avant-garde/experimental/personal film tradition(s) in Europe and the United States from the 1920s to the present.

[FILM 3770 Introduction to 16mm and Digital Filmmaking (LA-AS)

Fall, spring. 4 credits. Limited to 12 students. Intended primarily for juniors and, in spring, second-semester sophomores (who may need to sign up a year or more in advance), with priority given to film majors. Prerequisite: FILM 2740 (or higher-level film studies course) and permission of instructor. Equipment fee: \$150 (paid in class). Average cost to each student for materials and processing is \$500. M. Rivchin.

Creative, hands-on production course in filmmaking, emphasizing the development of original ideas and the acquisition of basic technical skills in digital video and 16mm formats: cinematography, lighting, sound recording, and digital editing. Students complete several exercises and two short projects exploring narrative, documentary, experimental, or animation forms, and a final project, which is shown in a public, open-campus screening at the end of the semester.

[FILM 3790 Modern Documentary Film (LA-AS)

Spring. 4 credits. Recommended: previous completion of FILM 3760. Offered alternate years. D. Fredericksen.

An intensive consideration of canonical documentary films from 1945 to the present. Emphasis is on the documentary film as an artistic and rhetorical form with a distinct history and set of theoretical questions.

[FILM 3830 Screenwriting (LA-AS)

Fall and spring. 4 credits. Limited to 12 students. Prerequisite: completed application, writing sample, and permission of instructor. Students must go to 223 Schwartz Center to apply. Staff.

This course explores the fundamentals of traditional Hollywood and independent screenplays.

[FILM 4220 Cinematography (LA-AS)

Fall. 4 credits. Limited to 8 students. Pre- or corequisite to FILM 4930. Prerequisite: permission of instructor. Letter grades only. Equipment fee: \$150 (paid in class). Camera, lighting, and directing techniques, designed for students who have taken at least FILM 3770. Course may also include a section devoted to acting and directing for the camera (with up to six film students and six acting students); consult the instructor. Offered alternate years.
M. Rivchin.

Students work in groups on a series of tests, short exercises, and scene projects using 16mm cameras, digital video cameras, HD camera movement apparatus, a range of lighting instruments, filters, and gels to expand their knowledge of the technical and aesthetic aspects of cinematography. When possible, the course will focus on acting and directing for the camera through scene work.

[FILM 4550 History of Modern Polish Film (LA-AS)

Fall. 4 credits. Prerequisite: some film analysis or European history course work. Offered alternate years. D. Fredericksen.

Analysis of Polish film from 1945 to the present, within the context of Poland's postwar history. Emphasis upon the ways Polish filmmakers dealt with the Soviet-imposed government and "political correctness" from 1944 to 1989.

[FILM 4730 Film and Spiritual Questions (LA-AS)

Spring. 4 credits. Limited to 20 students. Offered alternate years. D. Fredericksen.

The use of film as a medium for the expression of spiritual questions. Special attention is given to the work of Andrey Tarkovsky, the Russian film director and theorist.

[FILM 4740 Jung, Film, and the Process of Self-Knowledge (LA-AS)

Spring. 4 credits. Limited to 20 students. Offered alternate years; next offered 2010–2011. D. Fredericksen.

"Know thyself" is one of the oldest and most enduring imperatives of the human spirit. This seminar details the Jungian approach to this imperative and then tests its critical capacities with respect to films.]

[FILM 4750 Seminar in Cinema I (also AMST 4750) (LA-AS)

Fall. 4 credits. Next offered 2010–2011.
D. Fredericksen.

Topic for fall 2010: Cinematic structures: narrative, "poetic," thematic. Focus on semiotic-structural and cognitive theories of cinematic narration, theories of non-narrative structures, and relationships between structures and spectator psychology.]

[FILM 4760 Seminar in Cinema II (LA-AS)

Spring. 4 credits.

Topic for spring 2010: European Cinema/Metropolitan Culture. At least since the formation of the European Union, but possibly much earlier, the very idea of a "European Cinema" (as distinct from the national cinema idea) has been fantasized about and nurtured through transnational funding initiatives. This course establishes the concept of "European cinema" from industrial, social, and aesthetic perspectives. It then tracks European cinema by looking at specific European cities. Case studies may include Europe's best-known metropolises—London, Paris, Berlin—but also

cities found on the periphery, such as Marseilles, Naples, Helsinki, Warsaw, or Moscow. Films will be drawn from a range of genres and periods, from the famous "city symphonies" of the 1920s to the Eurothriller and the contemporary banlieu films. Topics may include the changing nature of the old European city, the relationship between built and cinematic form, migration and cosmopolitanism, class and gender, and will be framed by historical and theoretical readings. Topic for spring 2011 (Fredericksen): Film Eco-criticism: Human/Nature/Film.

[FILM 4780 Intermediate Film and Video Projects: Narrative Workshop (LA-AS)

Fall. 4 credits. Limited to 8 students. Intended for juniors and seniors, with priority given to film majors. Prerequisites: FILM 3770 as minimum in production; priority given to those who have also taken FILM 3830: THETR 3980 or FILM 4220, and permission of instructor based on proposals. Equipment fee: \$150 (paid in class). Digital video projects costs: \$100–\$200. Offered alternate years. M. Rivchin.

Intensive course in digital video production (with 16mm film as an option) in which each student develops a significant, original narrative script or documentary or experimental project that he or she then directs, shoots in crews, and edits. Readings, discussions, and exercises are designed to increase the student's knowledge and practice of screenwriting or other pre-visualization methods; pre-production, and practice of directing; cinematography, lighting, sound recording, and more advanced digital editing techniques. Completed projects are publicly screened at the end of the semester.

[FILM 4850 Undergraduate Internship

Fall or summer. 1–3 credits.

To be eligible to enroll and receive credit for an internship, students must either be majors or minors in the department. Students are responsible for arranging their own internships. To receive credit within the course, the internship must be unpaid. Students must follow the rules and procedures stated on the departmental internship form.

[FILM 4930 Advanced Film and Video Projects (LA-AS)

Spring. 4 credits. Limited to 6–8 students. Intended for seniors, with priority given to film majors. Permission only. Prerequisite: minimum FILM 3770, priority given to those who have taken 3240, 4220, or 4780. Recommended: FILM 3830 and THETR 3980. Equipment fee: \$150. Project costs: \$100–300 in digital video. Offered every spring. M. Rivchin.

Intensive filmmaking course in which students focus on developing and producing a single, already-proposed (15–25 min.) digital video project over the semester (HD and 16mm are options as well). Students direct and edit their own (or collaborative) projects working in crews for digital narrative films or documentaries, or individually for experimental or animation work, and in small groups for technical exercises and assisting others in projects. Readings, revision; directing; scene breakdowns, auditions, and casting; cinematography, lighting, location recording, digital video cameras; sound and editing techniques; and digital editing (Final Cut Pro, Color AVID, ProTools etc...).

FILM 6740 Introduction to Film Analysis: Meaning and Value (also FILM 2740, VISST 2174/6174)

Fall. 4 credits. Limited to 10 graduate students. D. Fredericksen.

Intrinsic consideration of the ways films generate meaning and of the ways we attribute meaning and value to films. Discussion ranges over commercial narrative, documentary, and personal film modes. Graduate students who intend to teach film at the undergraduate level are especially welcome. In addition to full participation in the work of FILM 2740, graduate students read and discuss primary sources in film theory in weekly group tutorials.

FILM 6750 History and Theory of the Commercial Narrative Film

Fall. 4 credits. Prerequisite for film majors FILM 2740. Fee for screening expenses: \$10 (paid in class). Offered alternate years; next offered 2010–2011. S. Haenni.

A survey of narrative cinema from around the world, with emphases on early narrative cinema, cinematic realism, interwar European modernist cinema, popular American film, post–World War II art cinema, and recent global cinema.

FILM 6760 History and Theory of Documentary and Experimental Film

Fall. 4 credits. Highly recommended: FILM 2740. Fee for screening expenses: \$10 (paid in class). Offered alternate years. A. Villarejo.

Analyzes canonical works in documentary film to World War II, and canonical works in the avant-garde/experimental/personal film tradition(s) in Europe and the United States from the 1920s to the present.

FILM 7220 Independent Study in Film for Graduate Students

Fall or spring. 1–4 credits. Staff.

Related Courses in other Departments

Not all courses are offered in 2009–2010. Consult instructors.

AMST 2020 Popular Culture in the United States, 1945 to the Present

Spring. 4 credits. Altschuler.

AMST 4306 American Art and the Machine

Spring. 4 credits. Meixner.

ANTHR 2432 Media, Culture, and Society

Fall 3 credits. Boyer.

ASIAN 3387 Literature and Film of South Asia

Fall. 4 credits.

COMM 1300 Visual Communication

Spring. 3 credits. Scherer.

COMM 3490 Media Technologies

Spring. 3 credits. Gillespie.

COMM 4220 Psychology of Television

Fall. 3 credits. Shapiro.

ENGL 3702 Desire and Cinema

Spring. 4 credits. Hansen.

ENGL 4690 Paranoid Style in Contemporary American Fiction and Film

Spring. 4 credits. Attel.

ENGL 4702 Documentary Record, Writing, and Film

Fall. 4 credits. Braddock.

ENGL 6600 Cinematic Desire

Spring. 4 credits. Hansen.

FGSS 3590 Consuming Passions: Media, Space, and the Body

Spring. 3 credits. Jeffer.

MUSIC 3421 Scoring the Moving Image Using Digital Technology

Spring. 4 credits. Ernste.

PSYCH 3050 Visual Perception

Fall. 4 credits. Cutting.

VISST 2000 Introduction to Visual Studies

Spring. 4 credits. Fernandez.

Dance

Faculty: J. Chu (on leave spring 2010), A. Fogelsanger (director of undergraduate studies in dance), E. Intemann, J. Kovar (on leave fall 2009), J. Morgenroth (on leave fall 2009), J. Self, B. Suber.

The dance program offers courses in dance technique, improvisation, composition, performance, anatomical analysis of movement, dance technology, music for dance, and the history, theory, and criticism of dance. Technique courses include introductory dance technique, modern dance at three levels, and Western classical dance at three levels. (Other dance forms, such as Indian dance, and capoeira, are offered periodically. A variety of courses in other dance idioms, taken through the Physical Education program, supplement these offerings.) Technique courses develop strength, flexibility, coordination, and the ability to perceive and reproduce phrases of dance movement with clarity of rhythm, body design, and expression. The more advanced courses require the ability to perform complex phrases in various styles. Students may earn up to 16 academic credits (2 each semester) in technique courses. Students may also satisfy the physical education requirement by taking dance technique courses or other movement courses in the dance program. Students taking technique for academic credit must also register through their own colleges. The schedule for all dance technique courses is available in the main office of the Sheila W. and Richard J. Schwartz Center for the Performing Arts.

The faculty offer rehearsal and performance workshops in which they choreograph and rehearse original dances, performed in public concert. Admission to rehearsal and performance courses is by permission. Students may receive one academic credit per semester (S–U grades only) when performing in student–faculty concerts by registering for DANCE 1250.

Major in Dance Requirements

Prerequisites: 2 credits in category I below and one course in category II below.

Prerequisites count toward the 40 credits fulfilling the major.

The major: 40 credits (toward which the prerequisites for the major count) are required of all students majoring in dance as follows:

- I. 6 credits: six 1-credit movement courses chosen from Dance Technique (DANCE 1200, 2200, 2210, 2220, 2240, 3210, 3220, 4210, and 4220), Explorations (DANCE 2410, 3410), Improvisation (DANCE 2480),

Indian Dance (1320), World Dance Techniques (1300), and other courses approved by the dance faculty. The 6 credits must include at least 2 from Dance Technique courses, and at least 2 from Explorations and Improvisation courses. Any two of these courses taken to satisfy the university's Physical Education requirement may be counted toward the major, thus decreasing the number of academic credits possibly to as low as 38. Movement courses taken for 0 academic credits do not count towards the major.

- II. 14 credits: Dance composition (DANCE 2500 and 3500) and history/theory (DANCE 3141 and 4080 or other 4-credit, 4000-level DANCE seminar course).
- III. 2 credits: 1 credit of performance (DANCE 1250) and 1 credit of production (DANCE 1610, 1630, 2610, or 2630).
- IV. 18 credits: selected from Dance and related fields, including: at most two additional 1-credit movement courses beyond those required in category I; at most 4 credits in DANCE 1250, 1610, 1630, 2610, 2630, and 3240 beyond those required in category III; and at most two courses outside of Dance, which may include courses on sound, music, light, world movement forms, design, performance and visual studies, and must be approved by the dance faculty. Otherwise any Dance courses may be used to satisfy category IV.

In all courses used for the dance major, a grade of C (not C–) must be achieved. Courses in which this minimum is not achieved must be repeated if the student is to receive credit in the major.

A partial list of courses from outside Dance that may be used to satisfy part IV of the major requirements includes MUSIC 1105, 1201, 1202, 1301, 1302, and 2101; and THETR 2500 and 3840.

Honors

The honors program in dance is intended for students who have shown exceptional accomplishment in the dance major, and it results in the awarding of one of three levels of honors with the degree: cum laude, magna cum laude, or summa cum laude. To be part of the honors program students must maintain a GPA of 3.5 in classes for the dance major and an average of 3.0 in all courses. Qualified students are invited to become candidates by the faculty early in the second semester of their junior years. As soon as possible thereafter, each honors candidate forms a committee of three dance faculty members to guide and evaluate the honors work. Candidates are encouraged to formulate a program based on interdisciplinary work, in which case the committee must include a faculty member from the relevant department in place of one from DANCE.

Candidates propose projects that will allow them to demonstrate their abilities in scholarship and/or practice, culminating in a public presentation of a thesis or creative work (demonstrating choreography, performance, or some other aspect of dance). A performance-oriented project requires a written analytical component related to the creative work, setting it in a historical, theoretical, or aesthetic context. (The paper is not simply a recounting of how a student did

the project.) The candidate must distribute a proposal to the committee members before the end of the junior year. Students planning a production component may show work on one of the department concerts, or may produce their own concerts. In this latter case they must inform the production manager of the Department of Theatre, Film and Dance by April 1 of the junior year as there is a limited number of slots for concerts within the Schwartz Center. A student not accepted for one of these slots will have to come up with an alternative proposal. Limited technical support will be available.

Although the honors committees, and in particular their chairs, are responsible for supervising candidates' honors programs and keeping them on schedule, candidates are required to take initiative and show independence in the planning and realizing of their proposed projects, beginning promptly at the start of the senior year on the 8 credits of work expected to be spread evenly throughout the two semesters. Candidates enroll in DANCE 4050-4060 with the chairs of the honors committees as instructors, and must schedule a full committee meeting at the beginning of the senior year and arrange to meet with their chairs on a regular basis thereafter, and with other committee members as necessary. After the public presentation in the spring, comprehensive examinations administered by the candidates' committees are held not later than the first day of finals. The level of honors conferred is based primarily on the candidates' performance in the honors programs, and secondarily on their overall record in departmental courses and activities.

Dance Minor

The Dance Minor is open to any student in the university, including those outside the College of Arts and Sciences, with the approval of the Director of Undergraduate Studies in Dance.

1. DANCE 2500 Beginning Composition (3 credits).
2. DANCE 3141 History (4 credits).
3. Other DANCE courses totaling a minimum 11 credits.

In all courses used for the Dance Minor that offer letter grades, a grade of C (not C-) must be achieved. Courses in which this minimum is not achieved must be repeated if the student is to receive credit in the Minor. For additional information please go to 223 Schwartz Center.

Computing in the Arts Undergraduate Minor

A minor in Computing in the Arts with an emphasis on dance is available both to dance majors and to students majoring in other subjects. For more information, see "Computing in the Arts Undergraduate Minor" under "Departments, Programs and Courses" in the "College of Arts and Sciences," or contact the Director of Undergraduate Studies in Dance, danceprogram@cornell.edu. Information is also online at www.cis.cornell.edu/ComputingArts.

Theatre, Film and Dance Summer Study in Rome and/or Paris/Dublin

Many of the dance courses are also offered during a summer program in Rome, Paris, and Dublin. For more information see www.arts.cornell.edu/theatrearts/academics/dance/

[roma2.pdf](#), or contact the program director, Byron Suber, at pbs6@cornell.edu.

Dance Technique

Students may register for any Western dance technique course (DANCE 1200, 2200, 2210, 2220, 2240, 3210, 3220, 4210, and 4220) for 1 academic credit, with a limit of 2 credits per semester and 16 credits total. That is, in a single semester students may take at most two 1-credit dance technique courses. All these courses may be repeated for credit, and students will usually be placed in a given course for at least two semesters.

Dance Improvisation (DANCE 2480), Explorations in Movement and Performance (DANCE 2410), World Dance Techniques (DANCE 1300), and Indian Dance (DANCE 1320) may be taken for 1 academic credit, which does not count as part of the 2 credit per semester and 16 credits total limit above.

Students also have the option to receive physical education (PE) credit for most of the courses above to satisfy the university's physical education requirement. Students may not get Dance and PE credit simultaneously for the same course.

The courses Dance Technique I (DANCE 1200), World Dance Techniques (DANCE 1300), Dance Improvisation (DANCE 2430), Explorations in Movement and Performance (DANCE 2410), and Indian Dance (DANCE 1320) are introductory courses open to all students. Students registering in Dance may pre-enroll, enroll online, or sign up with the Department of Theatre, Film, and Dance registrar in 223 Schwartz Center before the end of the add period; they will need a drop/add slip. Students registering in PE may pre-enroll, or add during the one- or two-day PE registration before the first day of classes; afterward, registration is not allowed.

The nonintroductory dance technique courses (DANCE 2200, 2210, 2220, 2240, 3210, 3220, 4210, and 4220) allow online pre-enrollment and online enrollment, but the instructor will ultimately use his or her own discretion to determine the right classes for a student to attend. All students, and new students in particular, should be prepared for the possibility of being asked to switch courses during the first few weeks of the semester.

The advanced dance technique courses (DANCE 2240, 3210, 3220, 4210, and 4220) may be taken with an additional 1-credit academic component, Writing Dance Criticism (DANCE 3240). Students may also receive credit for performing in two ways, by being cast in a faculty-choreographed dance (DANCE 1250), and by dancing in student-choreographed works made for composition courses (DANCE 1500). Any two 1-credit dance courses may be aggregated to count as one-half course for the purpose of satisfying the College of Arts and Sciences 34-course requirement. They do not satisfy a distribution requirement.

DANCE 1200 Dance Technique I (also PE 1180)

Fall and spring. 0 to 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S-U grades only. Fall, J. Chu; spring, B. Suber.

Entry-level class. Covers the fundamentals of elementary dance training. Movement sequences focusing on rhythm, placement, and vitality of performance through an anatomically sound dance technique.

DANCE 1250 Dance Rehearsal and Performance

Fall, spring, and summer. 1 credit. Students must register for course in semester in which credit is earned; requests for retroactive credit are not honored. Prerequisite: students cast in faculty-choreographed dances. Students may add this course only after they have been assigned roles. S-U grades only. Faculty. Includes the study, development, and performance of roles in departmental dance productions.

DANCE 1320 Indian Classical Dance (also PE 1190)

Spring. 1 credit. D. Bor.
For description, see PE 1190.

[DANCE 2200 Dance Technique II (also PE 1181)]

Fall. 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S-U grades only. Next offered 2010-2011. J. Self.
Introductory dance technique intended for students with some dance training. Material covered includes attention to rhythm, design, and movement expression.]

[DANCE 2210 Dance Technique II/Classical (also PE 1182)]

Spring. 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S-U grades only. Next offered 2010-2011. B. Suber.
Introductory Western classical technique intended for students with some dance training. Includes basic barre and centre work focusing on presence and presentation.]

DANCE 2220 Dance Technique II/Modern (also PE 1183)

Fall, spring, and summer. 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S-U grades only. Fall, B. Suber; spring, J. Kovar.
Introductory modern technique intended for students with some dance training. Material covered includes specific spinal and center work with attention to rhythm, design, and movement expression.

[DANCE 2240 Dance Technique Workshop (also PE 1188, VISST 2540)]

Spring and summer. 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. Requirements include attendance at performances with written responses. S-U grades only. Next offered 2010-2011. Spring, J. Kovar; summer, B. Suber and J. Chu.

This course will take a journey through movement using music as its driving force. Beginners and those with prior dance experience are welcome.]

DANCE 2410 Explorations in Movement and Performance (also PE 1191)

Fall. 1 credit. Limited to 16 students. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S-U grades only. J. Self.

A physically demanding exploration into various movement realms. Specific subjects covered are genderized movement, erotic power, spiritual power, ritual, and performance. Techniques include extensive use of breath, animal movement, improvisation, and group games. This course requires an eagerness to investigate the nature

of performance and explore unfamiliar territory in movement.

DANCE 2430 Hip-Hop, Hollywood, and Home Movies: Exploring Movement and Media (also VISST 2430) (LA-AS)

Fall and summer. 3 credits. Permission of instructor. Requirements include attendance at performances with written responses, selected readings, and home-movie production. Letter grades. Letter grades. J. Self.

This course is a laboratory for generating and exploring contemporary dance forms. Monday sessions are devoted to viewing media and discussion. We will be looking at early B-boy films, recent dance-battle documentaries, classic dance clips from Hollywood films, and other related pieces (Black Dance, Show Dance, Art Dance). Wednesday is a laboratory for trying out movements and creating simple dance/music videos (home-movies). This course will be of special value for choreographers using popular dance forms and those interested in the history of popular culture. Everyone must be willing and able to improvise dance moves, teach classmates and exchange movement ideas.

[DANCE 2450 Public Voice and Civic Gesture (also THETR 2360)]

Fall and summer. 1 credit. Next offered 2010–2011. B. Suber.

This course combines acting and movement techniques encouraging process-oriented work.]

DANCE 2480 Dance Improvisation

Spring and summer. 1 credit; may be repeated. Limited to 12 students. Attendance at dance concerts required. S–U grades only. A. Fogelsanger.

When the body knows when, where, and how to move without prior direction, we call that improvisation. This course coaxes inspiration, seeking to make it reliable and to keep it surprising. It offers the possibility of “training” one’s movement instincts to respond relevantly and with spontaneity. Solo and group forms are covered. Live musical accompaniment.

DANCE 3210 Dance Technique III/Classical (also PE 1184)

Fall, spring, and summer. 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S–U grades only. B. Suber. Intermediate Western classical technique. Work is done on strengthening the body through a movement technique emphasizing presence and musicality based on harmonic muscular control.

DANCE 3220 Dance Technique III/Modern (also PE 1185)

Fall, spring, and summer. 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S–U grades only. Fall, J. Self; spring, J. Morgenroth; summer, B. Suber and J. Chu.

Intermediate modern technique focusing on rhythm, placement, and phrasing for students who are prepared to refine the skills of dancing. Students are challenged by complex phrases and musicality.

DANCE 3240 Writing Dance Criticism

Fall and spring. 1 credit; may be repeated. Corequisite: DANCE 2240, 3210, 3220, 4210, or 4220. Attendance at two or three concerts required. Fall, J. Chu, B. Suber, or J. Self; spring, J. Self, B. Suber, and J. Morgenroth.

Dance criticism for incorporation with technique. Topics rotate depending on instructor, class focus, and relevance to guest dance companies. Attendance at two or three concerts required (same as for dance technique), additional readings and/or viewing of recorded performances as assigned by instructor, and three five- to seven-page analytic papers.

[DANCE 3250 Repertory]

Spring. 1 credit. Prerequisite: permission of instructor. Attendance at dance performances required. Next offered 2010–2011. J. Chu.

Reconstructs a dance by an important modern dance choreographer. Through a close examination of the composition process, and with readings, the course studies the historical and aesthetic role of this work and its continued influence today.]

[DANCE 3410 Explorations in Movement and Performance II: Masculine, Feminine, or Neutral]

Spring. 1 credit. Limited to 16 students. Prerequisite: DANCE 2410, 2480, or permission of instructor. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S–U grades only. Next offered 2010–2011. J. Self.

Continues themes from Explorations in Movement and Performance (DANCE 2410), with special emphasis on the differences and similarities between “masculine” or “feminine” expressions in movement and performance.]

DANCE 4210 Dance Technique IV/Classical (also PE 1186, VISST 4210)

Fall and spring. 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S–U grades only. B. Suber.

Advanced and pre-professional Western classical. A continuation of and supplement to DANCE 3210.

DANCE 4220 Dance Technique IV/Modern (also PE 1187, VISST 4220)

Fall and spring. 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S–U grades only. Fall, J. Chu; spring, J. Self.

Advanced and pre-professional Modern technique. A continuation of and supplement to DANCE 3220.

DANCE 4290 Dance Technique in New York City

Fall and spring. 1–2 credits. Students take DANCE 4290 during the semester they participate in the Urban Semester Program offered by the College of Human Ecology, and in addition to the 15 credits taken for that program. S–U grades only. Dance faculty.

Allows a student to receive up to 2 credits for taking professional dance technique courses while in residence in New York City. The semester before participating in the Urban Semester Program, the student writes a proposal under the guidance of a member of the dance faculty detailing the dance classes, dance teachers, and dance institutions which the student plans to include in a regular

program of dance technique. While the proposal may be revised during the semester in residence in New York, the dance faculty adviser must approve any changes. Credit will not be given retroactively.

DANCE 4399 Early Dance (also MUSIC 4511)

Fall. 1 credit. R. Harris-Warrick. For description, see MUSIC 4511.

Dance Composition

DANCE 2500 Beginning Dance Composition (also VISST 2511) (LA-AS)

Fall, spring, and summer. 3 credits. Attendance at dance concerts required. Fall, B. Suber; spring, J. Self; summer, B. Suber, J. Chu, and J. Kovar.

Weekly assignments in basic elements of choreography. Students compose and present short studies that are discussed and reworked. Problems are defined and explored through class improvisations. Informal showing at end of semester. Includes informal showing of work.

DANCE 3500 Intermediate Dance Composition I (LA-AS)

Fall, spring, and summer. 3 credits. Prerequisite: DANCE 2500. Fall, B. Suber; spring, J. Self; summer, B. Suber, J. Chu, and J. Kovar.

Intermediate choreographic projects are critiqued in progress by faculty and peers. Consideration of design problems in costuming and lighting. For full description, see DANCE 2500.

DANCE 3510 Intermediate Dance Composition II (LA-AS)

Fall, spring, and summer. 3 credits. Prerequisite: DANCE 3500. Co- or prerequisite: DANCE 3530. Attendance at dance concerts required. Fall, B. Suber; spring, J. Self; summer, B. Suber, J. Chu, and J. Kovar.

Continuation of DANCE 3500. For full description, see DANCE 2500.

DANCE 3530 Music and Choreography (also MUSIC 4512) (LA-AS)

Fall. 3 credits. Attendance at dance concerts and music concerts required. A. Fogelsanger.

Intended to expose students to music they probably have not heard and are unlikely to seek out on their own, particularly contemporary “classical” music and music used in modern concert dance; to mark out the possible relationships between music and dance when combined in concert; and to pull apart the compositional construction of musical pieces to consider what musical structuring ideas might be profitably applied by choreographers to making dances. The course also considers examples from film and the plastic arts, provides students with some experience making sound and movement, and includes discussion of and writing about concerts, and audio and video recordings. Reading topics include criticism and aesthetics of dance, music, and the arts in general, in particular concentrating on counterpoint, minimalism, improvisation, and polystylism.

DANCE 4010 Senior Project in Dance

Fall and spring. 3 credits; students receive grade when DANCE 4020 is completed. Prerequisite: DANCE 3510; senior dance majors. *NOTE: This course is being phased out and replaced by DANCE 4011 Advanced Project in Dance. Open only to students graduating by May 2010.*

First of a two-semester sequence (the second is DANCE 4020) for senior dance majors. Students create a project in choreography and performance, dance, film or video, dance pedagogy, or other appropriate area agreed on with their senior project advisor and committee. In addition, there is a 15-page paper that expands their work into a historical, theoretical, or aesthetic context. For guidelines see the director of undergraduate studies in dance.

DANCE 4011 Advanced Project in Dance

Fall and spring. 4-6 credits, variable. Students create a dance project. Possibilities include a choreographic project for performance/presentation, community performance, site-specific work, interdisciplinary collaboration, community teaching, conference organizing, or other proposals. The student chooses a project adviser, who need not be the student's academic adviser. A proposal is due April 1 if the project will take place in the fall and due November 1 if the project will take place in the spring.

DANCE 4020 Senior Project in Dance II

Fall or spring. 3 credits. Prerequisite: DANCE 4010. *NOTE: This course is being phased out and replaced by DANCE 4011 Advanced Project in Dance. Open only to students graduating by May 2010.*

Second of a two-semester sequence (the first is DANCE 4010) for senior dance majors.

DANCE 4500 Advanced Dance Composition I (LA-AS)

Fall, spring, and summer. 3 credits. Prerequisite: DANCE 3510. Attendance at dance concerts required. Fall, B. Suber; spring, J. Self; summer, J. Chu, B. Suber, and J. Kovar.

Students work on advanced choreographic problems, to be presented in performance. Work in progress is critiqued by faculty members on a regular basis. For full description, see DANCE 2500.

DANCE 4510 Advanced Dance Composition II (LA-AS)

Fall, spring, and summer. 3 credits. Prerequisite: DANCE 4500. Attendance at dance concerts required. Fall, B. Suber; spring, J. Self; summer, J. Chu, B. Suber, and J. Kovar.

Continuation of DANCE 4500. For full description, see DANCE 2500.

History, Criticism, and Theory**[DANCE 3120 The Moving Body: Form and Function (PBS supplementary list)]**

Fall. 4 credits. Next offered 2010-2011. J. Morgenroth.

Examines the bodily systems involved in human movement with particular attention to dance movement. Readings in texts on human anatomy, physiology, and kinesiology.]

DANCE 3141 History: The Body in Performance (LA-AS)

Fall. 4 credits. Prerequisites: readings, viewing of videos, and attendance at live performances. Letter grades only. J. Chu.

How does the social production of dance reflect its historical context? What is the meaning of the "beautiful" in dance? Beginning with 16th-century court dances, we will explore how aesthetics have been aligned both with and against politics in various periods and genres of the performing body, looking at dance as insiders' diplomacy and outsiders' rebellion. Is postmodern dance a discourse of its past? What is the contemporary relationship among African, European, and stubbornly American traditions? This course is designed to promote a critical appreciation of dance, its values and its ambitions, by developing an historical and cultural understanding.

DANCE 4000 Paper in Dance

Fall and spring. 4 credits. Prerequisite: DANCE 4080. Attendance at dance concerts is required.

Under faculty direction, the students write a paper in dance history, criticism, or theory.

DANCE 4080 Seminar in Dance Studies (also VISST 4580) (CA-AS)

Spring and summer. 4 credits. Limited to 15 students. Spring, J. Morgenroth; summer, B. Suber and J. Chu.

Topic for spring 2010: Movement in Time and Space

According to modern science, we live in a space-time continuum. The visual arts, including dance, painting, sculpture, film, and theater, manipulate time and space in order to situate their work in space-times of their own devising. While the arts and sciences are often thought of as existing in separate worlds, practitioners of each realm are exploring similar questions within their own modes of inquiry. Thinking about dance performance will be pivotal in this course, looking at the ways in which artists in the 20th and 21st centuries have warped traditional notions of time and space. We will also consider how scientific theories about time and space have affected the arts. Viewing of selections from dances by Merce Cunningham, Anna Halprin, Trisha Brown, Elizabeth Streb, Eiko & Koma, and others. Two papers and an individual or paired project that will ask that you reexamine and renew your assumptions about time and space.

Topic for summer 2010: Performativity in Paris

This course is a critical survey of the history of Western concert dance beginning in the 16th century into the court of Louis XIV, the early 19th-century Romantic period, the Franco-Russian Diaghilev Period, and 20th-century modern dance, including the work of Josephine Baker and the African American presence in Paris and 21st-century form of martial art/dance called Parkour, developed in the *banlieu* in the periphery of Paris. Special attention is paid to connections between the body and material space and place in the built domain of urban Paris. Dance, architecture, and urban development will be studied in tandem as reflections of western ideology looking to see how these art forms have contributed to, perpetuated, or confronted issues of classicism, modernity, race, class, gender, sexuality, and political and social power.

[DANCE 4089 Formalist Aesthetics of Modernism and Postmodernism in Music, Dance, and Painting]

Spring. 4 credits. Limited to 15 students.

Next offered 2010-2011. A. Fogelsanger. This seminar examines the formalist side of the aesthetics of modernism from the idea of absolute music and the rise of abstraction in painting, through atonality, modern dance, minimalism, and postmodernism.]

Interdisciplinary Courses**DANCE 1540 Computing in the Arts (also CS/CIS/ENGRI 1610, FILM 1750, MUSIC 1465, PSYCH 1650) (LA-AS)**

Fall. 3 credits. G. Bailey.

For description, see CS 1610.

[DANCE 2580 Courses of Action: Producing Performance Locally, Regionally, Globally (LA-AS)]

Fall. 3 credits. Next offered 2010-2011. J. Self.

This course is a hands-on, pro-active course devoted to studying current performance venues on the Cornell campus, and in Tompkins County, New York State, and beyond.]

DANCE 3550 Techno Soma Kinesics: Repositioning the Performing Body in Space through the Lenses of Digital Media (LA-AS)

Spring. 4 credits. B. Suber.

Works to expand the specific aesthetics of live performance (music, theatre, and dance) and traditional technological media presentation (sound, film, and video) through the use of emerging digital technologies. Included in the process is the analysis of built environments that both inspire and are designed to be inhabited by these disciplines. This studio course explores the resulting neo-performance forms being created within the range of digital media processing; such as gallery installations, multimedia dance-theatre, personal interactive media (games and digital art) and web projects. Computer-imaging and sound-production programs are examined and used in the class work (human form-animation software [Life Forms], vocal recording and digital editing [Protools and Hyperprism], digital-imaging tools [Photoshop, Final Cut Pro, Flash, Dreamweaver, and Director]. The new context of digital performance raises questions concerning the use of traditional lighting, set, costume, and sound-design techniques that are examined as they are repositioned by digital-translation tools with the goal of creating experimental and/or conceptual multimedia performance and/or installation work. Theoretical texts on dance and theatrical performance, film studies, the dynamic social body, architecture, and digital technology are also used to support conceptual creative work.

[DANCE 3560 Interactive Performance Technology (also MUSIC 3441, THETR 3690) (LA-AS)]

Fall. 3 credits. Laptop computer and MAX/MSP software and Jitter software required, see www.cycling74.com for student software pricing. Lab performance at end of semester. Next offered 2010-2011.

W. Cross and A. Fogelsanger.

For description, see THETR 3690.]

[DANCE 3570 Media Arts Studio I (also FILM/MUSIC 3910) (LA-AS)]

Fall or spring. 3 credits. Prerequisite: permission of instructor and junior standing, minimum FILM 2770 or 3770, or DANCE 3550. Equipment fee: \$50 (paid in class). Next offered 2010–2011. Participating faculty include M. Rivchin, film; B. Suber, dance.

A collaborative interdisciplinary studio course in a variety of digital and electronic media, including art, architecture, music, dance, film, and video.]

DANCE 3580 Ancient/Modern Corporeal Realities (also FILM/ITAL 3270, VISST 3210)

Summer. 4 credits. B. Suber, J. Rhodes, and B. Milles.

Held in Rome, this course examines that modern city as it interfaces with its past, by analyzing corporeal/spatial epistemologies through the analyses of films that used Rome as a location, visiting those location sites that extend from the historic center to as far as the suburb LEUR. Topics include examination of the ways in which class relates to social and public space and urban space as performance. Additional course work in film production, performance, and writing allows students to re-inscribe their spatial/corporeal experiences into an alternative exhibition space of the city street or the written page. In addition, each student will be required to produce formal textual documentation and full textual analyses of this process and final performance, installation, or text-based product.

DANCE 3590 Music, Dance, and Light (also THETR 3190, VISST 3519) (LA-AS)

Spring. 3 credits. Attendance at dance concerts and music concerts required. E. Intemann and A. Fogelsanger.

Artistic values, parameters, and concerns of music (sound design), dance, and lighting design are compared and contrasted, and the combination of design elements is analyzed in contemporary dance.

[DANCE 4377 Ritual Puppetry in a Global Context (also ASIAN/RELST 4444)]

Spring. 4 credits. Next offered 2010–2011. J. M. Law.]

DANCE 4550 Techno Soma Kinesics II: Repositioning the Performing Body in Space through the Lenses of Digital Media (LA-AS)

Spring. 4 credits. B. Suber.

Continuation of DANCE 3550. DANCE 4550 expands on principles using more complex and interactive software using MAX/MSP and Jitter, Director, DVD Studio Pro, and Dreamweaver.

DANCE 4848 Communities in Multicultural Practice (also HE 4800)

Fall and spring. 6 credits. S. Beck.

This course is the same as HE 4800 but the DANCE number is for DANCE students from the Department of Theatre, Film and Dance who wish to participate in the Urban Semester Program, or for other students in the College of Arts and Sciences who wish to receive credit within the college. Students from DANCE will, whenever possible, have their community service assignments within appropriate dance organizations or activities. For these purposes, the instructor will be assisted by various DANCE faculty and alumni.

DANCE 4849 Multicultural Practice (also HE 4900)

Fall and spring. 6 credits. S. Beck.

This course is the same as HE 4900 but the DANCE number is for DANCE students from the Department of Theatre, Film and Dance who wish to participate in the Urban Semester Program, or for other students in the College of Arts and Sciences who wish to receive credit within the college. Students from DANCE will, whenever possible, have their internship assignments within appropriate dance organizations or activities. For these purposes, the instructor will be assisted by various DANCE faculty and alumni.

Production**DANCE 1610 Dance Production Laboratory I**

Fall and spring. 1–3 credits; may be repeated for credit. Prerequisite: permission of instructor. No experience required. Orientation meeting at 7:30 p.m. first Tuesday of classes each semester in Kiplinger Theatre at Schwartz Center. P. Lillard.

Provides practical experiences in running stage crew or dresser crew for dance.

DANCE 1630 Dance Stage Management Production Laboratory I

Fall and spring. 1–2 credits; may be repeated for credit. Before registering, students must attend orientation meeting at 7:30 p.m. in Kiplinger Theatre at Schwartz Center on first Tuesday of classes. Prerequisite: permission of instructor. P. Lillard.

Practical experience in dance production as assistant stage manager for a dance theatre concert under the supervision of the faculty production manager. THETR 3700 complements this course.

DANCE 2610 Dance Production Laboratory II

Fall and spring. 1–3 credits; may be repeated for credit. Prerequisite: permission of instructor. Orientation meeting at 7:30 p.m. on first Tuesday of classes each semester in Kiplinger Theatre at Schwartz Center. P. Lillard, D. Hall, F. Sellers, and R. MacPike.

Practical experience in dance production, as a light board operator, sound board operator, video operator, or head dresser.

DANCE 2630 Dance Stage Management Laboratory II

Fall and spring. 1–4 credits; may be repeated for credit. Before registering, students must attend orientation meeting at 7:30 p.m. in Kiplinger Theatre at Schwartz Center on first Tuesday of classes. Prerequisite: permission of instructor. P. Lillard.

Practical experience in theatrical production as assistant stage manager for the dance mainstage concert under the supervision of the faculty production manager. THETR 3700 complements this course.

DANCE 3660 Lighting Design Studio I (also THETR/VISST 3620) (LA-AS)

Fall. 4 credits. E. Intemann. For description, see THETR 3620.

DANCE 3680 Sound Design and Digital Audio (also MUSIC 3431, THETR 3680) (LA-AS)

Fall and spring. 3 credits. W. Cross. For description, see THETR 3680.

DANCE 4660 Lighting Design Studio II (also THETR 4620, VISST 4563) (LA-AS)

Spring. 4 credits. C. Intemann. For description, see THETR 4620.

Independent Study, Internships, and Honors**DANCE 3000 Independent Study**

Summer, fall, or spring. 1–4 credits. Independent study in the dance allows students the opportunity to pursue special interests not treated in regularly scheduled courses. A faculty member, who becomes the student's instructor for the course must approve the student's program of study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study, which is available in 223 Schwartz Center.

DANCE 4050 Honors Research Tutorial I

Fall or spring. 4 credits. Prerequisite: honors students in dance.

First of a two-semester sequence (the second is DANCE 4060) for seniors engaged in an honors project. For guidelines, see the director of undergraduate studies in dance.

DANCE 4060 Honors Research Tutorial II

Fall or spring. 4 credits. Prerequisite: honors students in dance.

Second of a two-semester sequence (the first is DANCE 4050) for students engaged in an honors project.

DANCE 4850 Undergraduate Internship

Fall, spring, or summer. 1–3 credits.

To be eligible to enroll and receive credit for an internship, students must be majors in the department. Students are responsible for arranging their own internships in consultation with the faculty in their area of choice *before* preregistration for the semester in which the internship is planned to take place. To receive credit within this course, the internship must be unpaid. Students must follow the rules and procedures stated in the departmental internship form.

Tracks toward admission into the advanced undergraduate theatre program**Design, Technology, and Stage Management**

Recommended for individuals interested in a **Design, Technology, or Stage Management** track:

THETR 2500 Fundamentals of Theatre Design and Technology

THETR 1510 and 2510 Production Lab I and II (at least 1 credit of each)

Recommended for Scenic Design emphasis:

THETR 3400 Theatrical Drafting and Technical Drawing Studio

THETR 3510 Production Lab III (as design assistant)

THETR 3540 Stagecraft Studio

THETR 3640 Scene Design Studio

Upon admission to the program:

THETR 4510 Production Lab IV (at least 1 credit)

Recommended for costume design or costume shop management emphasis:

THETR 3510 Production Lab III (as design assistant)

THETR 3560 Costume Construction Studio

THETR 3660 Costume Design Studio I

THETR 3710 Costume Design Studio II

Upon admission to the program:

THETR 4510 Production Lab IV (at least 1 credit)

Recommended for Lighting Design or costume shop management emphasis:

THETR 2520 Technical Production Studio I

THETR 3510 Production Lab III (as student electrician)

THETR 3510 Production Lab III (as design assistant)

THETR 3620 Lighting Design Studio I

Upon admission to the program:

THETR 4510 Production Lab IV (at least 1 credit)

Recommended for Sound Design emphasis:

THETR 2510 Production Lab II (as student sound technician)

THETR 2520 Technical Production Studio I

THETR 3510 Production Lab III (as design assistant)

THETR 3680 Sound Design Studio

Upon admission to the program:

THETR 4510 Production Lab IV (at least 1 credit)

Recommended for Technical Direction emphasis:

THETR 2520 Technical Production Studio I

THETR 2560 Technical Production Studio II

THETR 3400 Theatrical Drafting and Technical Drawing Studio

THETR 3510 Production Lab III (as assistant technical director)

THETR 3540 Stagecraft Studio

Upon admission to the program:

THETR 4510 Production Lab IV (at least 1 credit)

Recommended for Stage Management emphasis:

THETR 2530 or **3530** Stage Management Lab II or III—two assignments

THETR 2800 Introduction to Acting

THETR 3700 Stage Management Studio

THETR 3980 Fundamentals of Directing I

Upon admission to the program:

THETR 4530 Stage Management Lab IV

Directing

Recommended for individuals interested in a directing track:

THETR 1510 and **THETR 2510** Production Lab I and II (at least 2 combined credits)

THETR 2400/THETR 2410 Introduction to Western Theatre (one semester *only*)

THETR 2500 Fundamentals of Design and Technology

THETR 2800 Introduction to Acting

THETR 3980 Directing I

THETR 4980 Directing II

Playwriting

Recommended for individuals interested in a playwriting track:

THETR 2400/2410 Introduction to Western Theatre (one semester *only*)

THETR 2500 Fundamentals of Design and Technology

THETR 2800 Introduction to Acting

THETR 3480 Playwriting

THETR 3490 Advanced Playwriting

Students in the advanced undergraduate theatre program may also elect to take FILM 4850 (Undergraduate Internship) in addition to or in place of one production assignment.

TURKISH

See "Near Eastern Studies."

TWI/AKAN

See "Africana Studies and Research Center."

UKRAINIAN

See "Department of Russian."

URDU

See "Department of Asian Studies."

VIETNAMESE

See "Department of Asian Studies."

VISUAL STUDIES UNDERGRADUATE MINOR

Visual studies is a minor that provides students with an interdisciplinary approach to visual art, media (including digital works), performance, and perception. Faculty from departments throughout the college offer courses toward the minor, drawing on such various disciplines as the history of art, film, literary studies, psychology, theatre, and others. Requirements for the minor include the core course VISST 2000 Introduction to Visual Studies, which introduces students to critical thinking about visual studies as well as close textual analysis in social and historical contexts. Responsibility for teaching the core course rotates among faculty affiliated with the minor, and the course, as much as possible, entail interdepartmental collaboration in the form of team-teaching or visiting lectures. In addition to the core course, students must take one course within the Theory/Practice group plus three additional courses at the 3000 level or above. No more than two courses from the minor may be double-counted toward a student's major. All courses must be taken for a letter grade.

Students interested in pursuing the minor should first discuss it with their current advisors, and then either download the form from the visual studies web site (www.arts.cornell.edu/histart/vstudies.html) or contact the visual studies undergraduate coordinator, Jessica Smith. After completing the form, students should attach a copy of their transcript and submit it to Jessica Smith in GM08 Goldwin Smith Hall. Students who have not been in contact with a visual studies advisor will have one selected for them from among the minor's affiliated faculty.

Interdisciplinary Graduate Concentration

The concentration in visual studies is not meant to substitute for disciplinary training, which will not be waived by the addition of interdisciplinary courses. The "Course List in Visual Studies for 2009-2010" alerts incoming students to courses that may be relevant to

their interests, and aids them in discovering the network of professors working in visual studies, spanning multiple departments and schools at Cornell.

Visual Studies Minor Course List

VISST 1101 Design Studio I (also DEA 1010)

Fall. 3 credits. J. Elliott.
For description, see DEA 1010.

VISST 2000 Introduction to Visual Studies (also ARTH/COML 2000, ENGL 2920) (LA-AS)

Spring. 4 credits. Requirement for undergraduate concentrators. I. Dadi.
Provides a broad introduction of modes of vision and the historical impact of visual images, visual structures, and visual space on culture, communication, and politics. The question of "how we see" is discussed in terms of (1) procedures of sight (from optical machines to the psychology of vision and the philosophy of aesthetics); (2) spaces of vision (from landscapes to maps to cities); (3) objects of vision (from sacred sites to illuminated books to digital art); and (4) performances of vision (race, sexualities, ethnicities, cultures). Of importance to the course is the practical and conceptual relation of 20th-century visual technologies (photography, cinema, video, and computing) to their historical corollaries in the arts. The course draws on the visual traditions of both Western and non-Western societies and study texts that have defined the premises and analytic vocabularies of the visual. Through viewings, screenings, collaborative writing, and art projects, students develop the critical skills necessary to appreciate how the approaches that define visual studies complicate traditional models of defining and analyzing art objects. Guest lecturers occasionally address the class. Requirements: two objective midterm exams; occasional listserv postings; two five-page papers.

VISST 2020 Introduction to Feminist Theory (also FGSS 2020) (CA-AS)

Spring. 3 credits. Staff.
For description, see FGSS 2020.

VISST 2174/6174 Introduction to Film Analysis: Meaning and Value (also FILM 2740/6740) (LA-AS)

Fall. 4 credits. Limited to 40 students.
Graduate students should enroll in FILM 6740. D. Fredericksen.
For description, see FILM 2740.

VISST 2190 Thinking Surrealisms (also ARTH 2019, COML 2200) (LA-AS)

Fall. 4 credits. B. Maxwell.
For description, see COML 2200.

[VISST 2193 Middle Eastern Cinema (also COML 2293, JWST/NES 2793) @ (LA-AS)]

Fall. 4 credits. Next offered 2010-2011.]

VISST 2300 Survey of American Film (also AMST/FILM 2760) (LA-AS)

Spring. 3 credits. S. Haenni.
For description, see AMST 2760.

[VISST 2360 Public Voice and Civic Gesture (also DANCE 2450, THETR 2360)]

Fall. 1 credit. Next offered 2010-2011.
For description, see DANCE 2450.]

VISST 2419 Rembrandt's Circle: Technologies of Vision (also ARTH 2419) # (CA-AS)

Fall. 4 credits. L. Pincus.
For description, see ARTH 2419.

VISST 2430 Hip-Hop Hollywood (also DANCE 2430, PE 1189)

Fall and summer. 3 credits. J. Self.
For description, see DANCE 2430.

[VISST 2540 Dance Technique Workshop (also DANCE 2240, PE 1188)

Spring and summer. 0–1 credit. S–U grades only. Next offered 2010–2011.
For description, see DANCE 2240.]

VISST 2511 Beginning Dance Composition (also DANCE 2500) (LA-AS)

Fall, spring, and summer. 3 credits.
For description, see DANCE 2500.

[VISST 2645 Renaissance and Baroque (also ARTH 2400) # (HA-AS)

Fall. 4 credits. Each student must enroll in a sec. Next offered 2010–2011. C. Lazzaro.
For description, see ARTH 2400.]

VISST 2744 Gamelan in Indonesian History and Cultures (also ASIAN 2245, MUSIC 1341) @ (LA-AS)

Fall and spring. 3 credits. No previous knowledge of musical notation or performance experience required. C. Miller.
For description, see MUSIC 1341.

VISST 3175 History and Theory of Commercial Narrative Film (also FILM 3750) (LA-AS)

Fall. 4 credits. Fee for screening expenses: \$10 (paid in class). S. Haenni.
For description, see FILM 3750.

VISST 3176 History and Theory of Documentary and Experimental Film (also FILM 3760/6760) (LA-AS)

Fall. 4 credits. Fee for screen expenses: \$10 (paid in class). A. Villarejo.
For description, see FILM 3760.

VISST 3210 Ancient/Modern Corporealities (also DANCE 3580, FILM ITAL 32709) # (LA-AS)

Summer. 4 credits. B. Suber, J. Rhodes, and B. Milles.
For description, see DANCE 3580.

VISST 3305 Visual Perception (also PSYCH 3050)

Spring. 4 credits. Limited to 20 students. Prerequisite: PSYCH 2050 or permission of instructor. J. Cutting.
For description, see PSYCH 3050.

VISST 3318 Literature and Media in Japan (also ASIAN 3318, COML 3150)

Fall. 3 credits. B. deBary.
For description, see ASIAN 3318.

VISST 3342 Human Perception: Application to Computer Graphics, Art, and Visual Display (also COGST/PSYCH 3420, PSYCH 6420)

Fall. 3 or 4 credits; 4-credit option involves term paper. Prerequisite: PSYCH 1101 or permission of instructor. PSYCH 2050 strongly recommended. D. Field.
For description, see PSYCH 3420.

VISST 3443 Leonardo, Michelangelo, and Raphael (also ARTH 3440) # (HA-AS)

Spring. 4 credits. C. Lazzaro.
For description, see ARTH 3440.

VISST 3519 Music, Dance, and Light (also DANCE 3590, THETR 3190) (LA-AS)

Spring. 3 credits. E. Intemann and A. Fogelsanger.
For description, see DANCE 3590.

VISST 3560 Computing Cultures (also COMM 3560, INFO/STS 3561) (CA-AS)

Spring. 4 credits. R. Prentice.
For description, see STS 3561.

VISST 3620 Lighting Design Studio I (also DANCE 3660, THETR 3620) (LA-AS)

Fall. 4 credits. E. Intemann.
For description, see THETR 3620.

[VISST 3645 American Film Melodrama (also AMST/ENGL/FILM 3440, FGSS 3450) (LA-AS)

Spring. 3 credits. Next offered 2010–2011. S. Haenni.]

VISST 3655 The House and the World: Architecture of Asia (also ARTH 3855, ASIAN 3394) @ # (HA-AS)

Spring. 4 credits. K. McGowan.
For description, see ARTH 3855.

VISST 3662 Impressionism in Society (also ARTH 3760) # (CA-AS)

Spring. 4 credits. Not open to freshmen. L. Meixner.

For description, see ARTH 3760.

VISST 3672 The Art of the Historical Avant-Garde (also ARTH 3672, COML 3840, GERST/ROMS 3770) (LA-AS)

Spring. 4 credits. P. McBride.
For description, see GERST 3770.

VISST 3696 Arts of Southeast Asia (also ARTH 3850, ASIAN 3350) @ # (CA-AS)

Fall. 4 credits. K. McGowan.
For description, see ARTH 3850.

[VISST 3735 Performative Modernism (also ENGL/THETR 3350)

Fall. 4 credits. Next offered 2010–2011. N. Salvato.]

VISST 3740 Painting 19th-Century America (also AMST/ARTH 3740) # (CA-AS)

Fall. 4 credits. L. Meixner.
For description, see ARTH 3740.

VISST 3798 Fundamentals of Directing I (also THETR 3980) (LA-AS)

Fall. 3 credits. Limited to 10 students. Prerequisite: permission of instructor. Special consideration given to students who have completed THETR 2800 or intend to continue in area of stage or screen directing. Students should see instructor one year in advance to sign up for course. D. Feldshuh.

For description, see THETR 3980.

VISST 3812 Edge Cities: Celluloid New York and Los Angeles (also AMST/ARCH 3812)

Spring. 3 credits. S. Haenni and M. Woods.
For description, see AMST 3812.

VISST 3850 Commedia: A Contemporization of Physical Acting Styles and the Comic Approach (also THETR 3840) (LA-AS)

Spring. 4 credits. B. Milles.
For description, see THETR 3840.

VISST 3851 Partition/Fiction and Film (also ASIAN 3389, COML 3850)

Fall. 4 credits. A. Banerjee.
For description, see COML 3850.

[VISST 3870 Literature and Film of South Asia (also ASIAN 3387, COML 3860) @ (CA-AS)

Spring. 4 credits. Next offered 2010–2011. A. Banerjee.]

VISST 4200 Proseminar (also ARTH 4100/6100) (HA-AS)

Spring. 4 credits. Limited enrollment. Prerequisite: History of Art majors only. I. Dadi.
For description, see ARTH 4100.

VISST 4210 Dance Technique IV/Classical (also DANCE 4210, PE 1186)

Fall and spring. 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S–U grades only. J. Chu and J. Self.
For description, see DANCE 4210.

VISST 4220 Dance Technique IV/Modern (also DANCE 4220, PE 1187)

Fall and spring. 1 credit. By placement only; no pre-enrollment. Attendance at dance concerts required. J. Chu and J. Self.
For description, see DANCE 4220.

VISST 4260 Adaption: Text/Theatrically (also THETR 4260) (LA-AS)

Spring. 4 credits. B. Milles.
For description, see THETR 4260.

VISST 4436 Topics in Indian Film (also ASIAN 4436) @ (LA-AS)

Fall. 4 credits. D. Gold.
For description, see ASIAN 4436.

[VISST 4451 Prints and Visual Culture in Early Modern Europe (also ARTH 4451/6451) # (HA-AS)

Fall. 4 credits. Meets at the Johnson Museum. Next offered 2011–2012. C. Lazzaro.

For description, see ARTH 4451.]

VISST 4526 Caribbean Dialogs: Online! (also ARTH 4526) @ (CA-AS)

Summer only. 4 credits. P. Archer-Straw.
For description, see ARTH 4526.

VISST 4545 Text Analysis for Production: How to Get from the Text onto the Stage (also ENGL 4441, THETR 4450)

Spring. 4 credits. Limited to 15 students. Prerequisite: THETR 2500 or 2810 or 3890, or permission of instructor. B. Levitt.
For description, see THETR 4450.

[VISST 4546 Shakespeare in (Con)text (also ENGL 4210, THETR 4460) # (LA-AS)

Fall. 4 credits. Next offered 2010–2011. B. Levitt.

For description, see THETR 4460.]

VISST 4563 Lighting Design Studio II (also DANCE 4660, THETR 4620) (LA-AS)

Spring. 4 credits. Limited to 6 students; may be repeated for credit. Prerequisite: THETR 2500 or 3620, or permission of instructor. E. Intemann.

For description, see THETR 4620.

VISST 4580 Seminar in Dance Studies (also DANCE 4080)

Spring and summer. 4 credits. Limited to 15 students. Spring, B. Suber; summer, B. Suber and J. Chu.
For description, see DANCE 4080.

VISST 4607 The Museum and the Object (also ARTH 4107) (CA-AS)

Fall. 4 credits. Not open to freshmen or sophomores without permission of instructor. All classes meet in Johnson Art Museum Study Gallery. K. McGowan.
For description, see ARTH 4107.

VISST 4641 Comparative Modernities (also ARTH 4690/6690, COML 4910) © (CA-AS)

Fall. 4 credits. Next offered 2010-2011.
I. Dadi.]

VISST 4761 Art and Social Histories (also ARTH 4761) (CA-AS)

Fall and spring. 4 credits. Permission of instructor required; auditing not permitted. Not open to freshmen. L. Meixner.
Topic for fall 2009: Public Culture and the Great Depression; topic for spring 2010: American Art and the Machine. For description, see ARTH 4761.

[VISST 4800 Advanced Seminar in American Literature: Gender and Visual Culture in Women's Literature (also AMST/ENGL/FGSS 4790, ARTH 4979) (LA-AS)

Fall. 4 credits. Next offered 2010-2011.
S. Samuels.]

VISST 4821 Mobility and Invention (also ARTH/SHUM 4821)

Fall 4 credits. Limited to 15 students.
M. Fernandez.
For description, see SHUM 4821.

VISST 4825 African Port Cities: Empire Building at the Crossroads (also ARTH/SHUM 4825, ASRC 4607)

Fall. 4 credits. Limited to 15 students.
P. Meier.
For description, see SHUM 4825.

VISST 4826 Extrastatecraft (also GOVT 4678, SHUM 4826)

Fall. 4 credits. Limited to 15 students.
K. Easterling.
For description, see SHUM 4826.

VISST 4934 Art Writing: Tracing the Visible (also ARTH/SHUM 4934)

Spring. 4 credits. Limited to 15 students.
M. Jacobus.
For description, see SHUM 4934.

WELSH

See "Department of Linguistics."

WRITING PROGRAM

See "John S. Knight Institute for Writing in the Disciplines."

YIDDISH

See "Department of Near Eastern Studies."

ZULU

See "Africana Studies and Research Center."

FACULTY ROSTER

For Arts and Sciences Biology faculty see "Biological Sciences."

Abrams, Meyer H., Ph.D., Harvard U. Class of 1916 Professor of English Emeritus, English
Abruña, Hector D., Ph.D., U. of North Carolina, Chapel Hill. Emile M. Chamot Professor of Chemistry, Chemistry and Chemical Biology
Abusch, Dorit, Ph.D., U. of Massachusetts, Amherst. Prof., Linguistics
Aching, Gerard, Ph.D., Cornell U. Prof., Romance Studies
Adams, Anne, Ph.D., U. of Michigan. Prof. Emerita, Africana Studies and Research Center
Adams, Barry B., Ph.D., U. of North Carolina. Prof. Emeritus, English
Adams, James E., Ph.D., Cornell U. Prof., English
Adelson, Leslie A., Ph.D., Washington U. Prof., German Studies
Ahl, Frederick M., Ph.D., U. of Texas, Austin. Prof., Classics/Comparative Literature
Alexander, James P., Ph.D., U. of Chicago. Prof., Physics/LEPP¶
Alexandridis, Annetta, Ph.D., Ludwig-Maximilians-U. Munich (Germany). Asst. Prof., History of Art
Alkire, Elbern H., Ph.D., Cornell U. Sr. Lec., Romance Studies
Allmendinger, Richard W., Ph.D., Stanford U. Prof., Earth and Atmospheric Sciences/INSTOC#
Allmon, Warren, Ph.D., Harvard U. Adjunct Prof., Earth and Atmospheric Sciences
Alm, Cecilia, Ph.D., U. of Illinois, Urbana-Champaign. Lec., German Studies
Altschuler, Glenn C., Ph.D., Cornell U. The Thomas and Dorothy Litwin Professor of American Studies, American Studies
Ambegaokar, Vinay, Ph.D., Carnegie Inst. of Technology. Goldwin Smith Professor of Physics Emeritus, Physics/LASSP*
Amigo-Silvestre, Silvia., M.A., U. of Oregon. Sr. Lec., Romance Studies
Anderson, Benedict R., Ph.D., Cornell U. Aaron L. Binenkorb Professor of International Studies Emeritus, Government
Anderson, Christopher J., Ph.D., Washington U. Prof., Government
Andronicos, Christopher L., Ph.D., Princeton U. Assoc. Prof., Earth and Atmospheric Sciences
Anker, Elizabeth, Ph.D., U. of Virginia. Asst. Prof., English
Arcadi, Adam Clark, Ph.D., U. of Michigan. Assoc. Prof., Anthropology
Archer, Richard J., M.A., U. of Missouri, Kansas City. Assoc. Prof., Theatre, Film, and Dance
Arias, Tomas A., Ph.D., Massachusetts Inst. of Technology. Prof., Physics/LASSP*
Arms, William, Ph.D., U. of Sussex. Prof., Computer Science
Arroyo, Ciriaco M., Ph.D., U. of Munich (Germany). Emerson-Hinchliff Prof. Emeritus, Romance Studies/Comparative Literature
Ascher, Robert, Ph.D., U. of California, Los Angeles. Prof. Emeritus, Anthropology
Ashcroft, Neil W., Ph.D., Cambridge U. (England). Horace White Professor of Physics Emeritus, Physics/LASSP*
Assié-Lumumba, N'Dri, Ph.D., U. of Chicago. Prof., Africana Studies and Research Center
Attell, Kevin, Ph.D., U. of California, Berkeley. Asst. Prof., English
Auffret, Isabelle, M.A., L'Université Catholique de l'Ouest (France). Lec., Romance Studies

Back, Allen H., Ph.D., U. of California, Berkeley. Sr. Lec., Mathematics
Bailey, Graeme, Ph.D., U. of Birmingham. Prof., Computer Science
Baird, Barbara, Ph.D., Cornell U. Prof., Chemistry and Chemical Biology
Bala, Kavita, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Computer Science
Banerjee, Anindita, Ph.D., U. of California, Los Angeles. Asst. Prof., Comparative Literature
Baptist, Edward, Ph.D., U. of Pennsylvania. Assoc. Prof., History
Bar, Talia, Ph.D., Yale U. Asst. Prof., Economics
Baraldi, Michela, B.A. equivalent, U. of Bologna (Italy). Lec., Romance Studies
Barazangi, Muawia, Ph.D., Columbia U. Prof., Earth and Atmospheric Sciences/INSTOC#
Barbasch, Dan, Ph.D., U. of Illinois. Prof., Mathematics
Barseghyan, Levon, Ph.D., Northwestern U. Asst. Prof., Economics
Bassett, William A., Ph.D., Columbia U. Prof. Emeritus, Earth and Atmospheric Sciences
Basu, Alaka, MSc, U. of London (England). Assoc. Prof., Sociology
Basu, Kaushik, Ph.D., London School of Economics (England). Carl Marks Prof. of International Studies, Economics
Bathrick, David, Ph.D., U. of Chicago. Prof. Emeritus, German Studies/Theatre, Film, and Dance
Bättig von Wittelsbach, Kora, M.A., U. of Zagreb (Croatia)/M.A., Brown U. Sr. Lec., Romance Studies
Bauer, Simon H., Ph.D., U. of Chicago. Prof. Emeritus, Chemistry and Chemical Biology
Baugh, Daniel A., Ph.D., Cambridge U. (England). Prof. Emeritus, History
Bazarov, Ivan, Ph.D., Far Eastern State U. (Russia). Asst. Prof., Physics/LEPP¶
Bean, Rachel E., Ph.D., Imperial College (England). Asst. Prof., Astronomy/CRSR†
Bekerie, Ayele, Ph.D., Temple U. Asst. Prof., Africana Studies and Research Center
Bell, James F., Ph.D., U. of Hawaii. Assoc. Prof., Astronomy/CRSR†
Bem, Daryl J., Ph.D., U. of Michigan. Prof. Emeritus, Psychology
Bem, Sandra L., Ph.D., U. of Michigan. Prof., Psychology
Beneria, Lourdes, Ph.D., Columbia U. Prof., City and Regional Planning/Feminist, Gender, & Sexuality Studies
Benjamin, Daniel, Ph.D., Harvard U. Asst. Prof., Economics
Bennett, Karen, Ph.D., U. of Michigan. Assoc. Prof., Philosophy
Bensel, Richard, Ph.D., Cornell U. Prof., Government
Béreaud, Jacques, Doctorat d'Univ., U. of Lille (France). Prof. Emeritus, Romance Studies
Berest, Yuri, Ph.D., U. of Montreal (Canada). Assoc. Prof., Mathematics
Berezin, Mabel, Ph.D., Harvard U. Assoc. Prof., Sociology
Bernal, Martin G., Ph.D., Cambridge U. (England). Prof. Emeritus, Government/Near Eastern Studies
Bernstein, Sarah E., M.F.A., Yale U. Sr. Lec., Theatre, Film, and Dance
Bernstock, Judith, Ph.D., Columbia U. Assoc. Prof., History of Art
Besharov, Gregory, Ph.D., Stanford U. Sr. Lec., Economics.
Beviá, Monica, M.A., U. of Nevada, Reno. Lec., Romance Studies
Beviá, Tomás, M.A., U. of Nevada, Reno. Sr. Lec., Romance Studies
Bezhanova, Olga, Ph.D. Yale U. Mellon Assistant Professor, Romance Studies

- Billera, Louis J., Ph.D., City U. of New York. Prof., Mathematics
- Bindel, David, Ph.D., U. of California, Berkeley. Asst. Prof., Computer Science
- Bilson, Malcolm, D.M.A., U. of Illinois. Frederic J. Whiton Professor of Music Emeritus
- Bird, John M., Ph.D., Rensselaer Polytechnic Inst. Prof. Emeritus, Earth and Atmospheric Sciences
- Birman, Kenneth P., Ph.D., U. of California, Berkeley. N. Rama Rao Professor of Computer Science
- Bishop, Jonathan P., Ph.D., Harvard U. Prof. Emeritus, English
- Bjerken, Xak, D.M.A., Peabody Conservatory of Music. Assoc. Prof., Music
- Blackall, Jean F., Ph.D., Harvard U. Prof. Emerita, English
- Blackburn, Anne M., Ph.D., U. of Chicago. Assoc. Prof., Asian Studies
- Bloom, Arthur L., Ph.D., Yale U. Prof. Emeritus, Earth and Atmospheric Sciences
- Blume, Lawrence E., Ph.D., U. of California, Berkeley. Goldwin Smith Professor of Economics
- Blumin, Stuart M., Ph.D., U. of Pennsylvania. Prof. Emeritus, History
- Bock, David, Ph.D., SUNY Albany. Sr. Lec., Mathematics
- Bodenschatz, Eberhard, Ph.D., U. of Bayreuth (Germany). Adj. Prof., Physics/LASSP*
- Boettcher, Bonna, D.M.A., U. of Iowa. Adj. Prof., Music
- Bogel, Fredric V., Ph.D., Yale U. Prof., English
- Bogel, Lynda Donelia, M.Phil., Yale U. Sr. Lec., English
- Bosteels, Bruno, Ph.D., U. of Pennsylvania. Assoc. Prof., Romance Studies
- Boucher, Daniel, Ph.D., U. of Pennsylvania. Assoc. Prof. and H. Stanley Krusen Professor of World Religions, Asian Studies
- Bowers, John S., Ph.D., Massachusetts Inst. of Technology. Prof., Linguistics
- Bowes, Kimberly, Ph.D., Princeton U. Asst. Prof., Classics
- Boyce Davies, Carole, Ph.D., U. of Ibadan (Nigeria). Prof., Africana Studies and Research Center/English
- Boyd, Richard N., Ph.D., Massachusetts Inst. of Technology. Prof., Philosophy/Science and Technology Studies
- Braddock, Jeremy, Ph.D., U. of Pennsylvania. Asst. Prof., English
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Cornell University Calendar

Fall Semester

Course add/drop begins†
 Online registration verification†
 Residence halls open
 New undergraduate student registration
 New student orientation begins
 New graduate student registration
 Instruction begins
 Fall break: instruction suspended
 Instruction resumes
 Homecoming
 First-Year Parents Weekend
 Thanksgiving recess:
 instruction suspended, 1:10 P.M.
 Instruction resumes
 Instruction ends
 Study period
 Final examination period*

 Residence halls close

Winter Session Period Begins

Three-week classes begin
 Winter session period ends

Spring Semester

Online registration verification†
 Course add/drop begins†
 Residence halls open
 Instruction begins
 Spring break: instruction suspended
 Instruction resumes
 Instruction ends
 Study period
 Final examination period*

 Residence halls close (students who are graduating
 may stay through Commencement Day)
 Senior Week
 Commencement

Summer Session

Three-week session. registration/classes begin
 Eight-week session. registration/classes begin
 Six-week session. registration/classes begin

2009–10

Monday, August 10
 Monday, August 17
 Friday, August 21
 Friday, August 21
 Friday, August 21
 Monday, August 24
 Thursday, August 27
 Saturday, October 10
 Wednesday, October 14
 Saturday, October 17
 Friday–Sunday, October 30–November 1

 Wednesday, November 25
 Monday, November 30
 Saturday, December 5
 Sunday–Wednesday, December 6–9
 Wednesday, December 9–Friday,
 December 18
 Saturday, December 19

 Monday, December 28
 Monday, January 4
 Friday, January 22

2010–11

Monday, August 9
 Monday, August 16
 Friday, August 20
 Friday, August 20
 Friday, August 20
 Monday, August 23
 Thursday, August 26
 Saturday, October 9
 Wednesday, October 13
 Saturday, September 25
 Friday–Sunday, October 22–24

 Wednesday, November 24
 Monday, November 29
 Saturday, December 4
 Sunday–Wednesday, December 5–8
 Wednesday, December 8–Friday,
 December 17
 Saturday, December 18

 Monday, December 27
 Monday, January 3
 Friday, January 21

*Exams begin Wednesday at 7:00 p.m.

†Access via Student Center (studentcenter.cornell.edu)

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In this calendar, the university has scheduled classes, laboratories, and examinations on religious holidays. It is the intent of the university that students who miss those activities because of religious observances be given adequate opportunity to make up the missed work.

The Law School and College of Veterinary Medicine calendars differ in a number of ways from the university calendar. Please consult the catalogs of those colleges for details.

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**Johnson Graduate
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